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PROCEEDINGS

OF THE

American

ENTOMOLOGICAL SOCIETY

OF

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PROCEEDINGS

OF THE

ENTOMOLOGICAL SOCIETY

OF PHILADELPHIA.

STATED MEETING, April 11.

President **Bland** in the Chair.

Twenty members present.

A letter was read from J. Carson Brevoort, dated Brooklyn, March 17th, 1864, acknowledging his election as a Corresponding Member of the Society.

The following papers were presented for publication in the Proceedings:—

"Description of several new North American Ctenophoræ, by Baron R. Osten Sacken."

"Notes on some of the Diurnal Lepidoptera of the State of New York, with descriptions of their Larvæ and Chrysalides, by J. A. Lintner."

And were referred to Committees.

On report of the respective Committees, the following papers were ordered to be printed:—

Description of a New Genus and Species of North American NOCTUINA.

BY AUG. R. GROTE,

Curator of Entomology, Buffalo Society Natural Sciences.

PHILOMMA, nov. gen.

Size moderate; form slight; wings broad; anterior wings with the internal margin straight, external margin moderately oblique and rounded, costal margin slightly rounded, 12-veined, veins 5 and 6 free, vein 4 equidistant from 3 and 5 at base, discal cell open, subcostal cell small, elongate, its lower marginal vein indented midway between each extremity; posterior wings 8-veined, veins 1 and 2 free to base, veins 8 and 7 (costal and subcostal) diverging from a common stem at the extreme base; antennæ moderate, simple; tongue short; thorax moderately clothed with fine short hair; abdomen moderately stout, slightly exceeding the posterior wings, smooth, not crested; palpi slight, hardly exceeding the front; legs moderate, evenly clothed with short pubescence, hind tibiæ with four moderately stout spurs.

I erect this genus for a delicate Noctuid belonging to M. Boisduval's *Heliothidæ*, the ornamentation of which is peculiar and different from anything I have yet met with in the Noctuina. The ordinary spots and lines are absent except the transverse posterior line which is indicated by the difference of coloring between the median and subterminal spaces and by a series of white dots on the veins. At the outer extremity of the discal space, at the base of vein 5, is a small neatly defined rounded ocellus with a whitish center, annulated with reddish, and a second, larger, and with a blackish center, is situated on the median vein anterior to its furcation; these ocelli at first sight seem to indicate a corresponding vein structure, which, on denuding the wing of scales, is seen not to be the case.

The pterogostic structure resembles that of *Anthœcia* (*marginata*); the subcostal cell is broader at the middle and vein 4 is not so near 3 at its base; the tongue is shorter, wings relatively broader than in *Anthœcia*.

The eyes in the dried specimen are ornamented with petal-shaped marks, diverging, like radii, from a common center.

Philomma Henrietta, nov. sp. (Plate 2, fig. 1.)

Anterior wings broad; ordinary spots and lines obsolete. Median and basal spaces bright lemon yellow, without markings except two ocellated spots: the smaller, situate at the outer extremity of the discal cell at the base of vein 5, with a whitish center and a reddish encircling line which is darker shaded internally: the larger, situate on the median vein anterior to the branches, with blackish center and similar encircling line. Transverse posterior line subobsolete, regularly undulate, slightly arcuated superiorily, indicated by a series of white spots on the veins, subterminal and terminal spaces narrow, bright rose color; subterminal and terminal lines entirely obsolete; fringes rose color.

Costa rose color; internal margin from transverse posterior line to base narrowly bordered with the same shade.

Posterior wings silky, pale brownish, paler along the external margin; fringes pale, very slightly shaded with rose color.

Under surface of anterior wings silky, blackish on the disc, shaded with rose color in the terminal space and along costal and internal margins. Under surface of posterior wings silky, pale yellowish, shaded with rose color along costal margin and at external angle. Palpi, head, thorax and tegulæ, rose color; abdomen greyish; legs rose color on their outer surface, tarsi greyish. Expanse ¾ inch.

Hab. Eastern States. Coll. Ent. Soc. Philadelphia.

My specimens are apparently all ♀ ♀, and were taken by Mr. Ridings during the month of August at mid-day, on leaves of plants in the northern part of Massachusetts. The rose color of the anterior wings is brighter, but recalls the same shade in *Alaria florida.*

I append a list of the described North American species of Noctuina included under the present sub-family, following almost entirely the arrangement of Mr. Walker. I am led to believe that the limit of the genus *Heliothis* is at present too restricted, and that the species included under *Oria* Geyer, and perhaps other allied genera, will ultimately be found not improperly associated under the same generic name with *armigera*, though the coloration is widely different.

NOCTUINA, p. H-S.

HELIOTHIDÆ, Bdv., Guen., Walk.

ORIA Geyer.

sanguinea Geyer.

ALARIA Westw.

gauræ A. & S.
  matutina Hüb.
florida Guen.

LEPIPOLYS Guenée.

perscripta Guen.

CHLORIDEA Westw.

rhexiæ A. & S.
virescens Fab.
subflexa Guen.

TAMILA Guenée.

nundina Drury.
  nigrirena Haw.

PHILOMMA Grote.

henrietta Grote.

ANTHŒCIA Boisd.

marginata Haw., Gt.
  rivulosa Guen.
arcifera Guen.
  arcigera Walk.
Spraguei Grote.
jaguarina Guen.
lynx Guen.

HELIOTHIS Ochs.

tuberculum Hüb.
bina Guen.
spinosæ Guen.
pyralis Hüb.
lucilinea Walk.
exprimens Walk.
armigera Hüb.

ANARTA Ochs.

funesta Pk.
  funebris Hüb.
melaleuca Becklin.
  leucoptera Esp.
  moesta Hüb.
leucocycla Staud.
melanopa Becklin.
  tristis Hüb.
  rupestris Hüb.
  vidua Treit.
amissa Lefb.
algida Lefb.
Richardsoni Curtis.
septentrionis Walk.
constricta Walk.
rigida Walk.
impingens Walk.
cordigera Sebaldt.
  albirena Hüb.
brephoides Walk.

Notes on TENTHREDINIDÆ, with descriptions of new species,

In the Collection of the Entomological Society.

BY EDWARD NORTON.

Genus TRICHIOSOMA.

1. **Trichiosoma triangulum**, Kirby.

In place of the triangular black spot which ordinarily covers most of the tergum, a specimen from Colorado has most of the tergum yellowish rufous, with irregular black spots on the two basal segments above and beneath. Otherwise it agrees with specimens from Hudson's Bay Territory and California.

Rocky Mountains, Col. Ter. (Coll. Ent. Soc. Philad.) One male.

Genus HYLOTOMA.

2. **Hylotoma McLeayi**, Leach.

Leach describes the wings as "subfuscous, at the apex subhyaline," but the most common species in this country, which has come to be considered the typical species, has the wings smoky, at the apex clear, with a round fuscous spot beneath the stigma, which touches the first submarginal and does not extend beyond the black dot in the middle of the second. This is found from Maine to Illinois.

3. **Hylotoma ceruleus**, n. sp.

Blue-black, with violaceous wings and a fuscous spot below the stigma. (Long 0.32. Br. wings 0.70 in.)

♀. Color violaceous, shining; antennæ short, stout, black; palpi white; legs the color of body, their knees and anterior tibiæ dark piceous; wings smoky violaceous, clearer toward the tips; the whole of marginal cell fuscous; a round darker spot below the stigma, covering most of the first and second submarginal cells; nervures black; lower middle cell of underwings not more than half as long or large as the upper.

Pennsylvania. (Coll. Ent. Soc. Philad.) One female.

4. **Hylotoma clavicornis**, Fab.

This has the wings hyaline, their basal half a little smoky; the fuscous spot below the stigma semi-cylindrical, with the flattened side toward the tip of the wings.

Massachusetts. (Coll. Ent. Soc. Philad.)

5. **Hylotoma abdominalis**, Leach.

This is larger than *H. clavicornis*, but is very much like it; the abdomen is of one color, with the apex beneath sometimes blue-black;

the wings have the fuscous spot below the stigma round, with sometimes a fainter lengthened spot beneath, and their base more or less smoky.

The male is undescribed. Its antennæ are longer and are only tipped with yellowish. Its legs are black, with the anterior tibiæ pale before. The wings are clearer and the fuscous spot less distinct.

Massachusetts. (♀ 1, ♂ 1.)

6. **Hylotoma scapularis,** Klug.
H. calcanea, Say.

Ordinarily, the male and female are alike, having the head, breast, metathorax and abdomen blue-black; the pro- and mesothorax, scutel and pleura rufous, the legs blue-black, tibiæ and tarsi more or less whitish beneath; wings violaceous.

Var. *a.* ♂. Only the prothorax rufous; the mesothorax, scutel and pleura the color of body; legs below the knees almost entirely white; apical third of wings hyaline.

Pennsylvania. (Coll. Ent. Soc. Philad.)

A pair was taken in *coitu,* of which the female resembles the usual type, and the male varies as above.

Genus **ATOMACERA.**

7. **Atomacera ruficollis,** n. sp.

Black, the pro- and mesothorax and scutel rufous. (Long 0.17. Br. wings 0.40 in.)

♀. Shining black, short and stout; antennæ thickly ciliate, 3rd joint not clavate but decreasing in size from before the middle, very slender at tip; the 4th and 5th joints of palpi flattened and enlarged, apical joint of equal length, but slender; basal third of antennæ and face beneath ferruginous, hairy; tegulæ, anterior angle, mesothorax and scutel rufous; legs black, their anterior tibiæ dull whitish, tibial spurs very short and sharp; wings ample, blackish fuscous, clearer toward the apex, nervures blackish, stigma large; four submarginal cells, the 1st small, its cross nervure clear and indistinct, 2nd cell of equal width throughout, 3rd wider at apex than long; lanceolate cell short, petiolate; underwings with two middle cells.

Pennsylvania. (Coll. Ent. Soc. Philad.) One female.

Not having seen either of Say's species, I cannot feel sure that it belongs to this genus. The form of the 3rd submarginal cell is quite different. The abdomen is pointed like that of *Nematus,* while that of *Schizocerus* is like *Hylotoma.*

Genus SCHIZOCERUS.

8. **Schizocerus plumigera.**

Hylotoma plumigera, Klug. *Cryptus Klugii*, Leach.

♀. "Antennæ black; head black; thorax saffron yellow; abdomen yellow; anus black, legs black, yellow before; wings fuscous hyaline."

A specimen from the Rocky Mountains differs as follows. It has a spot on each side of scutel (below it), the basal plates and the breast black, the femora blackish except at tip, the tibiæ and tarsi color of body; wings subhyaline toward the tip; the 1st submarginal cell having a small rounded cell at its base as in *Hylotoma*, but the cross nervure is incomplete; 2nd cell half the length of 1st or 3rd and contracted beneath, its first cross nervure fractured at base, the 2nd or outer one fractured at base and summit; the lower middle cell of under wings half as long as the upper one.

Rocky Mountains, Col. Ter. (Coll. Ent. Soc. Philad.)

Genus NEMATUS.

9. **Nematus Marylandicus**, n. sp.

Black, apex of abdomen rufous; knees and part of tibiæ whitish, wings hyaline. (Long 0.28. Br. wings 0.63 in.)

♂. Color black; antennæ as long as body, slender, cylindrical, enlarged at joints, covered with a whitish pile; head and thorax with short whitish hair, longest on the labrum, where it is brownish; head smooth and shining, the depressions at sides of ocelli connected behind by a straight groove, the enclosure below lower ocellus rounded and open above and below; nasus with a deep angulate notch; apical segment of abdomen yellowish piceous; legs black, their four anterior knees, tibiæ, tarsi beneath and at base above, and basal half of posterior tibiæ whitish; nails piceous, their tips red; wings hyaline, stigma and costa pale; 2nd submarginal cell widest at the angle receiving 1st recurrent nervure, the 2nd nervure received just within the 3rd submarginal cell.

Maryland. (Coll. Ent. Soc. Philad.) One specimen.

10. **Nematus sub-albatus**, n. sp.

Black; tegulæ, venter and legs, except the middle of femora and tips of hinder tibiæ, whitish. (Long 0.28. Br. wings 0.62 in.)

♀. Color black; antennæ two-thirds the length of body, somewhat flattened, covered with short prostrate hair; 3rd joint longer than 4th; head not coarsely punctured; furrows at sides of ocelli connected above by a slender semi-circular groove; a shallow depression below the lower ocellus, beneath which is a deeper triangular sinus; nasus slightly emarginate, its edges, base of mandibles, labrum and palpi, white; tegulæ, anterior angle, venter and legs (in part) white; base of coxæ, a band on all the femora, apex of posterior tibiæ, posterior tarsi and apical joints of all the tarsi black; wings hyaline, apex and base of costa white; 2nd submarginal cell widest at the angle receiving 1st recurrent nervure; 2nd nervure coinciding with 2nd submarginal cross nervure.

Pennsylvania. (Coll. Ent. Soc. Philad.) One specimen.

11. **Nematus brunneus,** n. sp.

Head and thorax brown, abdomen and legs yellowish, wings hyaline. (Long 0.26. Br. wings 0.62 in.)

♀. Color ochre brown: antennæ black, about half the length of body, 3rd joint a little longer than 4th, a sort of W shaped depression above ocelli, lower ocellus in a flat, obovate distinctly enclosed space, not connected with the groove on the ridge between antennæ, which is very narrow: nasus incurved: edge of labrum almost square: head and thorax ochre dark brown; mouth, tegulæ, anterior angle, basal plates, abdomen and most part of legs, yellowish: tips of posterior tibiæ and their tarsi fuscous: winge faintly smoky, stigma and costa pale, 2nd submarginal with two angles beneath.

Rocky Mountains, Col. Ter. (Coll. Ent. Soc. Philad.) One female.

12. **Nematus erythrogaster,** n. sp.

Black; the collar and abdomen except at base above, rufous: wings clear. (Long 0.28. Br. wings 0.60 in.)

♀. Shining black: antennæ more than half the length of body, slender, joints not enlarged at tips, 3rd longer than 4th; head rugose with a large depression, trilobate below, enclosing ocelli; nasus moderately incurved, labrum piceous; apical half of mandibles rufous; tegulæ, a triangle on collar, and the abdomen, except the two basal segments rufous; legs varied, the coxæ, trochanters, intermediate tibiæ and tarsi and a band at the base of the hinder tibiæ, white, the four hinder femora and apex of intermediate tibiæ rufous; tips of hinder femora, apical two-thirds of their tibiæ and the tarsi, black; wings perfectly clear, stigma fuscous, costa pale.

Massachusetts. (Coll. Ent. Soc. Philad.) One specimen.

The anterior legs are wanting.

Genus **MESSA.**

13. **Messa hyalina,** n. sp.

Black, with white tegulæ and legs, and clear wings. (Long 0.16. Br. wings 0.36 in.)

♀. Shining black; antennæ slender, longer than beyond the base of abdomen, setaceous, 1st joint longer than 2nd, 3rd longer than 4th: head polished, rounded, almost smooth about the ocelli; nasus slightly incurved: labrum wide, rounded, and, with the mandibles at base and the tegulæ, white: abdomen somewhat stout and acute; legs white, the coxæ black, except at tip, posterior femora with a reddish tinge, tips of their tibiæ blackish; wings perfectly transparent, stigma almost wholly white; 1st submarginal somewhat rounded, 3rd almost square; 2nd recurrent nervure almost coinciding with 2nd submarginal cross nervure; lanceolate cell petiolate; underwings with two middle cells.

New Jersey. (Coll. Ent. Soc. Philad.) One specimen.

Genus **SELANDRIA.**

Sec. I. *Tribe* 2.

14. **Selandria barda.**

Allantus barda, Say.

Black; tegulæ, pro- and mesothorax and an angle on pleura, red. (Long 0.28. Br. wings 0.64 in.)

♂. Shining black; 2nd joint of antennæ as long but not as large as the 1st: 3rd as long as the 4th and 5th; head nearly as wide as thorax, polished; the abdomen wide and bluntly rounded at the end; the tegulæ, prothorax, mesothorax, the anterior half of scutel and an angle on forward part of pleura, red: legs black, the apical half of anterior femora and their tibiæ and the knees of intermediate pair reddish; wings ample, black-fuscous, darkest toward base, nervures black.

Var. ♂. The lobes of mesothorax partly black.

Pennsylvania. (Coll. Ent. Soc. Philad.) Two specimens.

15. **Selandria medius,** n. sp.

Black, with white tegulæ, collar and legs. (Long 0.20. Br. wings 0.45 in.)

♀. Shining black, antennæ as in *S. tiliæ;* the depressions at sides of ocelli join a straight cross groove above, but do not extend to summit; the lower ocellus is in an oval space, with no deep cross sinus below, as in *S. tiliæ;* tegulæ and most of anterior angle white, legs below trochanters reddish white; base of femora darkest; wings hyaline; marginal dividing nervure curved, received near middle of 3rd submarginal, 2nd recurrent nervure beneath, almost coinciding with 2nd submarginal cross nervure, 1st submarginal oval.

♂. Antennæ more flattened, more of black on the base of coxæ; marginal dividing nervure nearer to 3rd submarginal nervure; 2nd recurrent nervure received nearer to the middle of cell.

New Jersey. (Coll. Ent. Soc. Philad.)

Sec. III. *Tribe* 2.

16. **Selandria fasciatus,** n. sp.

Black; legs below the knees except tip of hinder tibiæ, white, basal half of wings blackish. (Long 0.20. Br. wings 0.50 in.)

♀. Shining black, 3rd joint of antennæ as long as the 4th and 5th; head shining, lower ocellus in a heart-shaped depression; a sinus between, above the base of antennæ, with a little pit upon each side; legs black: their tibiæ and tarsi, except the apical joints, pure white; the apex of posterior tibiæ black; wings ample, their basal half blackish fuscous; apical half hyaline.

Massachusetts. (Coll. Ent. Soc. Philad.) One specimen.

This may be a variety of *Selandria cerasi.* The broad band on the base of the wings is very distinct.

Genus **ALLANTUS.**

17. **Allantus unicinctus,** n. sp.

Black, a wide annulus on antennæ, the face beneath, collar, scutel, 4th and 5th segments of abdomen and lower half of legs, white. (Long 0.47. Br. wings 0.92 in.)

♀. Dull black: antennæ not as long as thorax, 1st joint twice as long as 2nd. 3rd as long as both the 4th and 5th; color black at base, from the 4th to 8th inclusive white, apical joint brownish; head rugose, with a sinus below the lower ocellus, nasus emarginate; labrum extended and pointed; both, with the base of mandibles, a wide mark on collar, upper half of scutel, a spot on each side of basal plates and an adjacent spot at base of posterior coxæ, the 4th and 5th segments of abdomen whitish straw color; thorax dull with fine separated punctures; legs black above the knees; the whole apical half of anterior femora, apical half of intermediate femora before and all the tibiæ and tarsi yellowish white; tips of posterior tibiæ blackish; tips of the four anterior tibiæ and of all the tarsi reddish: wings clouded, apical half darkest, nervures black, stigma and costa brown.

♂. The 4th and 5th joints of antennæ black above, the spot on collar small, the sides of 1st and 2nd and all of the 3rd segments of abdomen, except a spot on its apical end above, yellowish.

Rocky Mountains, Col. Ter. (Coll. Ent. Soc. Philad.)

18. **Allantus basilaris**, Say.

Var. *a.* ♂. Antennæ longer than usual; their two basal joints and part of the third somewhat rufous; abdomen lengthened, mostly black, with a large whitish spot on the 3rd, 4th and 5th segments above and beneath; legs reddish white, the intermediate femora above and most part of posterior femora black, their tibiæ ferruginous, darkest toward apex.

Massachusetts (Coll. Ent. Soc. Philad.); Maine. (Mr. Packard.)

Genus **MACROPHYA**.

Sec. 2.

19. **Macrophya bicinctus**, Norton.

Var. *a.* ♀. All the apical segments of the tergum beyond the third rufous, instead of only the 4th, 5th and 6th.

Massachusetts. (Coll. Ent. Soc. Philad.)

Sec. 3.

20. **Macrophya tibiator**, n. sp.

Black; the collar and basal plates white; a white line down the anterior femora and all the tibiæ and tarsi. (Long 0.39. Br. wings 0.76 in.)

♀. Dull black; 2nd joint of antennæ one-third the length of 1st; head nearly as wide as thorax, coriaceous below ocelli; nasus moderately incurved, white; labrum advanced, piceous; scutellum and pleura coarsely punctured; tegulæ, edge of collar and of basal plates, white: legs black, all of the trochanters, a line on the apical half of anterior femora and down all the four anterior tibiæ and tarsi before and the posterior tibiæ and tarsi above, white; all the tibiæ and tarsi tipped with black: apical half of all the wings smoky, their base clear, nervures blackish.

♂. The abdomen quite slender, a black spot on labrum, which is pale; a white line down all the coxæ and the four anterior legs, a lengthened wedge-like spot on posterior tibiæ above and a similar line on first tarsal joint: remaining joints white at base.

Massachusetts (Coll. Ent. Soc. Phila.); Connecticut.

The wings of those from Connecticut are of a light color. This is the *Macrophya epinotus*, Var. *b*, previously described.

21. **Macrophya zonalis**, n. sp.

Black, the tips of antennæ, mouth, collar, scutel, V spot, 3 spots on pleura, a band on each segment of abdomen and the legs in part, white. (Long 0.44. Br. wings 0.92 in.)

♀. Shining black, 3rd joint of antennæ nearly as long as 4th and 5th, the apex of the 5th and the four apical joints white, the extreme tip brown; head wide, polished, having obsolete punctures, strongly depressed at sides of ocelli; nasus slightly incurved, labrum conical, its form almost truncate; a spot above ocelli, a dot below antennæ, nasus and mouth below, collar, a V on front lobe of mesothorax, an annulus at the base of each segment, enlarged at the sides beneath, a spot below the anterior, a cross stripe below posterior wings, and a triangular spot in middle of pleura, white; legs black, the two anterior pair and the posterior femora white beneath, a large white spot on posterior coxæ; the four apical tarsi on the four anterior legs white, their tips black; posterior tarsi black, their first joint nearly as long as all the rest, wings faintly clouded on their apical half, nervures blackish.

Massachusetts. (Coll. Ent. Soc. Philad.) One specimen.

Genus **TENTHREDO.**

22. **Tenthredo pectoralis**, n. sp.

Black; the face, tegulæ, collar, most of body beneath and legs, white. (Long 0.36. Br. wings 0.72.)

♂. Color shining black; antennæ hardly longer than to first segment of abdomen, not stout, 3rd joint one-half longer than 4th; head polished; an enclosed oval space below lower ocellus; nasus emarginate, labrum rounded before; thorax dull with sparse punctures; nasus, mouth beneath, cheeks, a spot above the base of each of antennæ, tegulæ, collar, and the whole of body beneath, white; upper edge of pleura and a large semicircular line on pectus between 1st and 2nd pair of legs, black; legs black above and white beneath, coxæ mostly white, spurs long; wings faintly clouded on the apical half, nervures blackish.

Rocky Mountains, Col. Ter. (Coll. Ent. Soc. Philad.)

The antennæ are shorter than in any species that I have seen and are like those of *Macrophya*. The antennæ of the three following species are a little longer, but yet shorter than in most other species. The four species seem allied in their general form and markings, so as to form a separate group from other species.

23. **Tenthredo semi-rufus**, n. sp.

Black, the apical half of abdomen rufous; wings hyaline. (Long 0.46. Br. wings 0.92 in.)

♀. Color black: antennæ not longer than to 3rd segment of abdomen; joints swelled at tips, the 3rd one-half longer than 4th; head rugose, the furrows at sides of and behind ocelli very distinct; a cross suture on upper edge of head; clypeus deeply notched, labrum produced, rounded at end; both of these, the basal half of mandibles, collar and a dot above posterior coxæ, white; a spot on the 4th segment above and the five apical segments of abdomen rufous; legs black; the anterior pair below the coxæ white before; the femora of 2nd pair and the tibiæ and tarsi of both the hinder pair reddish, becoming whiter on the tarsi; apical joint of all the tarsi pale, hinder spurs long, rather blunt: wings slightly clouded: nervures, stigma and costa blackish.

Var. *a*. Collar and 4th segment of abdomen wholly black; posterior femora rufous before and the basal half of posterior tibiæ also rufous above; the costa in both pair of wings and some of the basal nerves reddish.

Rocky Mountains, Col. Ter. (Coll. Ent. Soc. Philad.) Two specimens.

24. **Tenthredo variegatus**, n. sp.

Black; the face, tegulæ, collar, breast and legs beneath white, apical half of abdomen rufous. (Long 0.36. Br. wings 0.76 in.)

♂. Color black: antennæ not longer than to 2nd segment of abdomen: head rugose, with distinct furrows at sides of ocelli; nasus and labrum as in the previous species: an oval dot above the base of each of antennæ, a short line on the summit of inner orbit, the cheeks, nasus and mouth beneath, tegulæ, collar, a longitudinal mark on pleura and a large spot on breast, before intermediate legs, a spot above posterior coxæ and all the legs beneath, including the coxæ, white: abdomen mostly yellow-rufous, the 1st, 2nd and half of 3rd and 4th segments of tergum black: venter toward its base whitish; legs black above; apex of coxæ white: tarsi all black, their patellæ beneath white; apical half of wings clouded, nervures black, basal half of stigma white, 2nd submarginal cell long and rather narrow, 3rd submarginal not longer than the width of its outer end: 2nd recurrent nervure received very near 2nd submarginal cross nervure.

Rocky Mountains, Col. Ter. (Coll. Ent. Soc. Philad.) One specimen. This may be a variety of *T. pectoralis*.

25. **Tenthredo variatus**, n. sp.

Black: face, cheeks, tegulæ, collar, line and spots on pleura and on breast, white: abdomen rufous. (♂ ♀ Long 0.46 to 0.48. Br. wings 0.86 to 0.92 in.)

♀. Color black: antennæ as in previous species, ends of joints somewhat globose: head enlarged behind the eyes and incurved behind; shining, having confluent punctures, depressions about ocelli as in previous species: nasus and labrum advanced, the latter rather pointed: a minute dot at summit of orbits, within, a spot above the base of each of antennæ, the face below, cheeks, tegulæ, collar, with a round connected dot below, a longitudinal line on the pleura, a spot above the anterior and posterior coxæ, another on the sides of basal plates and a spot on breast before intermediate legs, white: abdomen rufous with 1st, 2nd and 3rd segments above and beneath and the apex beneath black; legs black, red and white: all the coxæ (except a black spot above), trochanters and anterior legs before and all the patellæ, white, anterior pair above and both the posterior pair more or less rufous, with a slender black line down all the femora and the four anterior tibiæ; apical half of wings smoky, nervures black, stigma pale at base, costa reddish.

♀. Labrum not pointed, but rounded before; a slender white orbital line on the inner half of orbit; all of pleura, except a prolonged triangle beneath the wings and the breast, white; the femora whitish beneath.

Rocky Mountains, Col. Ter. (Coll. Ent. Soc. Philad.) Two specimens.

26. **Tenthredo xanthus**, n. sp.

Honey yellow: face, tegulæ, collar and a spot above posterior legs white; front of prothorax and a spot on breast, black. (Long 0.52. Br. wings 0.96 in.)

♀. Brownish honey yellow: antennæ not longer than to 2nd segment of abdomen, somewhat flattened, 1st joint stout, 2nd more slender, not half as long: the two basal joints and part of third beneath rufous, the remainder black: head as wide as thorax, thick, widened behind the eyes, furrows at sides of ocelli deep and narrow, enclosure behind square, nasus deeply incurved, labrum produced and rounded at end; head with indistinct confluent punctures; an obsolete line on inner orbits and a spot above each of antennæ, the face below, cheeks, tegulæ, collar with a connected dot beneath, the outer edge of basal plates and a spot above posterior coxæ white or pale straw color; the prothorax, the front of anterior lobe and a dot at base of sides of side lobes of mesothorax, breast, a narrow line in the sutures of the 2nd, 3rd, 4th and 6th segment and part of the apex beneath, black; legs the color of body, their anterior coxæ and the two anterior pair before, pale; inner spur on anterior tibiæ two-thirds as long as first joint of tarsi, sharp and widely bifid; hinder legs long and stout: wings smoky, nervures blackish, costa and basal nervures rufous; base of stigma pale.

Var. *a.* A triangular white spot on pleura.

Var. *b.* The antennæ whitish beneath.

Pike's Peak, Col. Ter. (Coll. Ent. Soc. Philad.) Twenty-two specimens examined.

This bears a close resemblance to *T. mellinus* of Maine and the White Mountains.

27. **Tenthredo angulatus**, n. sp.

Black, with the orbits, face below antennæ, collar, V spot on thorax, an angular line and spots on pleura and the breast white; apical half of abdomen rufous. (Long 0.32. Br. wings 0.70 in.)

♂. Shining black; antennæ very long, enlarged and flattened in middle, 3rd joint a little longer than 4th; head polished, an orbital line interrupted at summit and diverging from outer side of eye in its upper half, the face below antennæ, edge of anterior angle, V spot on thorax, a large slender angular line on pleura, a spot above posterior coxæ and the breast, white; coxæ black above: the four anterior legs white, black above; posterior legs black, their trochanters white and femora in the middle whitish: abdomen rufous, the two basal segments and sides of third black, at base beneath paler: wings hyaline, nervures blackish.

Massachusetts. (Coll. Ent. Soc. Philad.) One specimen.

This resembles *T. dissimilis*, especially in the length and form of antennæ, but there is no angular line on the pleura of that.

28. **Tenthredo formosus**, n. sp.

Black, with inner orbital lines, face below antennæ, cheeks, collar, spots on sides of scutel and on pleura, venter and legs in part, white; apex of tergum and posterior femora, rufous. (Long 0.53. Br. wings 0.98 in.)

♀. Shining black; antennæ moderate, joints enlarged at tip; 3rd joint one-half longer than 4th; head large and wide, polished, furrows about ocelli distinct; lower ocellus in an oval sinus, open above and below, nasus deeply notched, clypeus round; a stripe from near the summit of head half down the inner orbit on each side; the face below antennæ, cheeks, tegulæ, collar, a spot on each side of scutel, with an outer-side spot, three dots beneath on each side of postscutel, edge of basal plates, a large spot on pleura with one before and two behind it and the venter, except at tip, white; the five apical segments of tergum, and apex of venter rufous; the coxæ, trochanters, most of anterior legs, of middle femora and basal third of posterior femora, white; intermediate tibiæ and tarsi and most of posterior femora and tibiæ rufous; a slender black line down the two anterior pair of legs, the base of posterior femora above, the apex of tibiæ and their tarsi black; apical half of wings somewhat clouded, nervures blackish, stigma at tip black, its base and the costa pale rufous.

♂. The male has most of the tergum rufous, and the breast and coxæ of a waxen color.

Massachusetts. (Coll. Ent. Soc. Philad.) Maine.

I have received this fine insect from Mr. Scudder (Mass.), and from Mr. Packard (Maine.)

29. **Tenthredo semi-rubra**, n. sp.

Black; the apical half of abdomen rufous. (Long 0.54. Br. wings 0.98.)

♀. Shining black; antennæ moderate, slender, enlarged at tips of joints, slightly flattened beyond the middle, 3rd joint longer than 4th; head thickened, wider than thorax, polished, with deep depressions at sides of ocelli: a square, punctured, enclosed space back of ocelli, a deep sinus below lower ocellus extending between antennæ; nasus emarginate, labrum rounded before: both, with the mandibles and palpi, white; the two basal segments of abdomen black, remainder rufous; abdomen lengthened and not very stout: legs black.

the anterior tibiæ before, all the spines, the four anterior tarsi and apex of last joint of posterior tarsi piceous; wings faintly clouded on apical half.

Massachusetts. (Coll. Ent. Soc. Philad.) One specimen.

This may prove to be a variety of *T. tricolor*. The abdomen is formed like that of *T. angulifer* and *T. formosus*.

30. **Tenthredo rufo-pedibus**, n. sp.

Black: the middle of abdomen and most part of legs rufous. (Long 0.44. Br. wings 0.92 in.)

♂. Black; antennæ moderate, slender, joints enlarged at tips, 3rd longer than 4th; head wide, polished, depressions as in last species; nasus with a deep semicircular notch; a minute oval dot above base of each of antennæ, face and cheeks beneath, tegulæ, collar, a wide angulate line like an L on pleura and a spot above both anterior and posterior coxæ, white; breast waxen; abdomen rufous on the 3rd, 4th, 5th and part of the 6th segments above and all but the two apical segments beneath; legs mostly rufous, the four anterior coxæ waxen: a spot on the tips of anterior femora above and the apical half of posterior tibiæ and their tarsi black, except end of apical joint, which is rufous; ends of intermediate joints blackish; wings large, hyaline.

Pennsylvania. (Coll. Ent. Soc. Philad.)

The wings are larger than those of *T. rufipes* and *T. rufopectus*, and the antennæ longer.

Genus LYDA.

Sec. I. Anterior tibiæ with one side spur.

31. **Lyda brunnicans**, n. sp.

Ochre brown, with many yellow spots on head and body. (Long 0.48. Br. wings 1.06 in.)

♀. Color ochre brown; antennæ long, slender, about 36-jointed, color of body; head polished having sparse punctures, depressions very slight, edge of nasus irregular: ocelli black; two oval spots on occiput, enclosed by two semilunate spots, which are enlarged at ends and touch the eyes, two large spots outside of antennæ, two obsolete spots above antennæ, cheeks, edge of nasus, obsolete spots on collar and anterior lobe and base of middle lobes of mesothorax and scutel, the postscutel, prothorax beneath, most of pleura, a spot above posterior coxæ and the edges of abdominal segments beneath, white, or straw color; legs color of body: one side spur on anterior and three on the sides of four posterior tibiæ: wings ample, clouded, clearest at base, nervures brown; marginal dividing nervure coinciding with the 2nd submarginal cross nervure; 3rd brachial cell without cross nervure.

Rocky Mountains, Col. Ter. (Coll. Ent. Soc. Philad.) One specimen.

The abdomen of this species is very wide and large.

Sec. II. Anterior tibiæ without side spur.

32. **Lyda multisignatus**, n. sp.

Black; many yellow spots on head and thorax; abdomen rufous. (Long 0.32. Br. wings 0.72 in.)

♀. Shining black: antennæ black, 24-jointed, 1st joint three times as long as 2nd: head polished, with furrows at sides of ocelli from antennæ to back of head, connected by a straight cross furrow; mandible long, sharp, bidentate: one mandible with a small tooth between 1st and 2nd and the other with merely a projection: a lunate spot on each side above ocelli, enclosed by two larger lunate spots, which connect with a short inner orbital line, four ovate parallel spots above antennæ, a large spot on cheeks, nasus (with two inner black dots), base of mandibles, palpi, tegulæ, collar, a V on anterior lobe, a triangular spot at base of each middle lobe of mesothorax and the summit of scutel, pale straw color: abdomen yellow-rufous: legs of three colors: the coxæ and trochanters black, femora white, tibiæ and tarsi dark waxen: each of the four posterior tibiæ with two side spurs; wings ample, slightly clouded at ends, marginal dividing nervure not coinciding with 2nd submarginal nervure, the 3rd brachial cell with incomplete cross nervure.

Rocky Mountains, Col. Ter. (Coll. Ent. Soc. Philad.) One specimen.

Genus **XYPHIDRIA**.

33. **Xyphidria tibialis**, Say.

This specimen differs from Say's description in having whitish spots upon the head. The antennæ are black, 15-jointed, 3rd and 4th equal, very slender toward the tip. There are two oval spots on the summit, and a line, interrupted on occiput, around the outer edge of head ending on the inner orbit, opposite antennæ. In other respects this agrees with that described by Say.

Ohio. (Coll. Ent. Soc. Philad.) One specimen.

Genus **UROCERUS**.

34. **Urocerus Cressoni**, n. sp.

Black, the antennæ tipped with white, the apex of abdomen rufous. (Long 0.64, with ovipositor 0.86. Br. wings 1.24 in.)

♀. Black; antennæ 20-jointed, the ten apical joints straw color, the base of the 11th and tip of last joint brown; head and thorax coarsely punctured; a rufous spot not defined at edges, back of the eyes at the sides of occiput; the six basal segments of abdomen of a soft velvety purple-brown, the three apical segments rufous; legs black, the base of posterior tibiæ and of 1st joint of their tarsi white, remaining joints blackish, nails of all the tarsi red; wings obscure brownish violaceous, nervures piceous.

Pennsylvania. (Coll. Ent. Soc. Philad.) One specimen.

The wings are more obscure than those of *Urocerus albicornis*.

On the North American species of the genus OSMIA.

BY E. T. CRESSON.

Genus OSMIA, Latr.

"The *labial palpi* four-jointed, the basal joint elongate, the second nearly twice as long, the third and fourth minute, the third inserted at the apex of the second, the fourth at the apex of the third, the two latter clavate, truncate at their apex. The *maxillary palpi* four-jointed, the basal joint stoutest, broadest at the base, about the same length as the second and third joints, the apical joint minute. The *superior wings* with one marginal and two submarginal cells, the second submarginal cell receiving the two recurrent nervures.

"In the female the head is usually very large, subquadrate, the ocelli placed forward on the vertex in a slight curve; the abdomen furnished with a dense pollen-brush beneath.

"Males usually resembling the female, but more slender, having the antennæ longer, and the apex of their abdomen generally armed with spines or teeth."—Smith, *Bees of Great Britain*, p. 157.

The bees of this interesting genus are generally of a bluish or greenish color, having a short, robust form, more or less pilose, the head large, especially in the females, and the abdomen mostly subglobose. A very interesting account of the economy of these bees is given by Mr. Smith (*ibid.* pp. 158—162).

In this paper I have 33 North American species to record, all of which are known to me except two—*O. frigida* Smith, and *O. bucconis* Say. In separating the closely allied species, I have relied much on the difference of sculpture and punctation, which seems to be very constant in the same species, although when more material has been accumulated, we may find intermediate grades of variation that will make varieties of some that are now considered distinct species.

1. **O. bucephala**, n. sp.

Female.—Head very broad, subquadrate, as large as the thorax, black with a slight bluish-green reflection, densely and finely punctured, clothed with rather long pubescence, which is black on the clypeus, dense and ochraceous about the insertion of the antennæ, sparse on the vertex, and dense and fuscous on the cheeks beneath; apical margin of the clypeus suddenly, strongly and squarely produced in the middle, and fringed beneath with a short fulvous pubescence, the lateral angles of this projection are obtuse but prominent; on each side of the clypeus immediately above the base of the mandibles a small shining tubercle; mandibles very stout, rugose and clothed with short fuscous pubescence, their apex broad, armed with three short teeth, the innermost one blunt, and the two outer ones approximate and subacute; lower margin of each mandible with a deep longitudinal channel, and a large irregular tubercle at the base immediately below each extreme lateral angle of the clypeus; inner orbits of the eyes acutely carinated; antennæ about the length of the head, black. Thorax black, finely and very closely punctured; densely clothed with rather long pubescence which is ochraceous above and on the sides, and fuscous beneath; tegulæ black, shining and feebly punctured. Wings fusco-hyaline, apical margin paler; nervures blackish. Legs black, clothed with black or fuscous pubescence. Abdomen subglobose, black with a greenish-blue reflection, minutely punctured, polished; basal segment above thickly clothed with rather long ochraceous pubescence; the second segment with dark fuscous pubescence intermixed with ochraceous on the anterior part; third, fourth and fifth segments with short black pubescence; apical segment clothed with very short ochraceous pubescence; beneath the ventral scopa is dense and black. Length 7½ lines.

Hab.—Great Slave Lake, British America. One specimen. Coll. Smithsonian Institution.

This and the next species are at once distinguished from all others known to me, by the large size, robust form and the unusually large head. Both species closely resemble each other, but are sufficiently distinct by the characters given in the descriptions.

2. **O. megacephala,** n. sp.

Female.—Head very broad, subquadrate, rather larger than the thorax, black with a slight bluish reflection, densely and somewhat strongly punctured, clothed with rather long black pubescence, except a tuft above the insertion of each antenna which is ochraceous, the pubescence dense on the face and clypeus and sparse on the vertex; clypeus and mandibles as in the preceding species; inner orbits of the eyes acutely carinated; antennæ about the length of the head, black. Thorax closely and somewhat strongly punctured, black, densely clothed with rather long ochraceous pubescence, with a slight mixture of black on the disk above; metathorax opaque blue-black, very minutely punctured, with a deep impression on its disk; tegulæ black, shining, feebly punctured. Wings subhyaline, apical margins clouded; nervures black. Legs black, with black hairs; tarsi beneath clothed with fuscous pubescence. Abdomen subglobose, black, with a very slight bluish reflection, polished, minutely punctured; the pubescence colored above and beneath as in the preceding species. Length 7¼ lines.

Hab.—Rocky Mountains, Colorado Territory. One specimen. Coll. Entom. Soc. Philadelphia.

Closely resembles the preceding species, but differs by the stronger punctation of the head and thorax, by the less robust form and by the different color of the wings. The head in this species is rather larger than the thorax, whereas in *bucephala* the head and thorax are about equal in size.

3. **O. longula,** n. sp.

Female.—Head subtransverse, black slightly tinged with deep blue in certain lights, subopaque, very densely, closely, and uniformly punctured; face and clypeus with a sparse black pubescence, that on the vertex ochraceous, and on the cheeks beneath long and fuscous; clypeus slightly prominent, with the apical margin subemarginate; mandibles rather deeply channelled near the outer margin, apex armed with three teeth, the two innermost ones short and blunt, the outer tooth longer and subacute; antennæ longer than the head, black. Thorax black, with a greenish reflection posteriorly, subopaque, very densely, finely and closely punctured, clothed above with long ochraceous pubescence; tegulæ piceous, minutely punctured. Wings subhyaline; nervures fuscous. Legs black, with black pubescence, tarsi with fuscous pubescence. Abdomen subglobose, broader posteriorly, black with a greenish-blue reflection, polished, finely punctured; basal segment above clothed with ochraceous pubescence, remaining segments with short black pubescence; beneath the ventral scopa is dense and black. Length 7 lines.

Hab.—Rocky Mountains, Colorado Territory. One specimen. Coll. Entom. Soc. Philadelphia.

4. **O. juxta,** n. sp.

Female.—Head subtransverse, as wide as the thorax, black, with a deep blue reflection, densely and rather strongly punctured, face and vertex clothed with fuscous pubescence intermixed with ochraceous about the base of the antennæ and on the vertex; apical margin of the clypeus truncate; mandibles stout, lower margin channelled, apex broad and armed with three teeth, the innermost one being short and bifid, and the others long and subacute; antennæ short, black. Thorax black, tinged with greenish posteriorly, opaque, very densely and finely punctured, clothed above with long ochraceous pubescence, beneath with fuscous pubescence; tegulæ black, finely punctured. Wings subhyaline; nervures blackish. Legs black, clothed with short fuscous pubescence. Abdomen subglobose, finely and rather densely punctured, polished, black with a bright bluish reflection changing to green towards the tip; basal segment thinly clothed above with ochraceous pubescence, remaining segments with a very short scattering black pubescence; beneath, the ventral scopa is dense and black. Length 6 lines.

Hab.—Rocky Mountains, Colorado Territory. One specimen. Coll. Entom. Soc. Philadelphia.

Closely allied to *O. longula*, but rather smaller, the head longer and broader, the clypeus truncate in front, and the mandibles larger, with their teeth differently shaped, the antennæ shorter, the second submarginal cell not so broad, and the abdomen not so robust as in that species.

5. **O. latitarsis**, n. sp.

Male.—Head dark blue-green, densely and finely punctured, clothed with long whitish pubescence which is rather thin on the vertex and cheeks and very dense on the face; mandibles black, shining, deeply bified at tip, the inner tooth short, broad and truncate, the outer one rather long and acute; antennæ black, as long as the head and thorax. Thorax dark blue-green, densely and finely punctured, clothed with long dense whitish pubescence; tegulæ black, shining. Wings subhyaline, apical margins faintly clouded; nervures blackish. Legs black, clothed, especially the femora beneath, with rather long whitish pubescence; tarsi beneath with fuscous pubescence; the second, third and fourth joints of the intermediate tarsi subtriangular and broadly dilated; the innermost spur of the posterior tibiæ slightly incurved at tip, very long and about twice the length of the other; basal joint of the posterior tarsi rather long, clavate, broadest at tip; apical joints of all the tarsi piceous. Abdomen broadest posteriorly, incurved at tip, black, with a blue-green reflection, shining, very densely and finely punctured, apical margin of the segments above smooth and shining; the two basal segments above clothed with whitish pubescence, that on the basal segment longest; the third, fourth and fifth segments clothed with black pubescence; apical margin of the sixth segment broadly rounded, strongly reflexed, obsoletely notched in the middle and fringed with long whitish pubescence, also a thin patch of long pale pubescence on the disk of this segment; apical segment very slightly and obtusely emarginate at tip. Length 5¼ lines.

Hab.—New York, Virginia. Three ♂ specimens. Coll. Entom. Soc. Philadelphia, and Mr. E. Norton.

Readily distinguished by the joints of the intermediate tarsi being subtriangular and broadly dilated.

6. **O. hudsonica**, n. sp.

Male.—Head black, finely and densely punctured, clothed with long ochraceous pubescence which is dense on the face; antennæ black, nearly as long as the thorax. Thorax black, finely and densely punctured, thickly clothed with long ochraceous pubescence, which is paler and more sparing beneath; tegulæ black, clothed with ochraceous pubescence. Wings subhyaline, the marginal cell and the apical margins clouded; nervures black. Legs black, thinly clothed with ochraceous pubescence; apical joints of the tarsi rufous. Abdomen elongate, clavate, much narrowed towards the base and incurved at the apex; black, shining, densely and minutely punctured, the apical margin of the segments above smooth and shining; basal segment above clothed with ochraceous pubescence, the remaining segments with black pubescence, that on the two apical segments mixed with fuscous and ochraceous; apical margin of the sixth segment broadly rounded, reflexed, obtusely notched on the middle and sulcate on the disk; apical segment slightly emarginate at tip; the margin of the second segment beneath is produced into a large semicircular flattened plate. Length 5 lines.

Hab.—Hudson's Bay Territory. One specimen. Coll. Mr. E. Norton.

Resembles *O. latitarsis* in its general form, but quite distinct. These two species, especially the former, have much the appearance of certain males of *Megachile*, e. g. *M. melanophæa* Smith, but the maxillary palpi are 4-jointed.

7. **O. chalybea,** Smith.

Osmia chalybea, Smith, Brit. Mus. Cat. i, p. 143. (1854.)

"*Female.* Length 6 lines.—Steel-blue, head very large, subquadrate and strongly punctured, the abdomen more finely so; the anterior margin [of the clypeus] produced in the middle, the apex of the lobe emarginate, the margin on each side crenulated; the mandibles very large, a deep groove running along their inferior margin from the apex to the base, where it terminates in a pit or hollow. Thorax, the sides thinly covered with griseous pubescence; beneath densely clothed with black pubescence.

"*Male.*—Closely resembles the female, the margin of the clypeus in this sex is entire, and the margin of the apical segment notched in the middle; beneath, the ventral segment bidentate.

"*Hab.*—St. John's Bluff, East Florida."

One ♀ specimen of this fine insect, from Florida, is in the collection of Mr. Edward Norton. I have not seen the male.

8. **O. lignaria,** Say.

Osmia lignaria, Say, Bost. Journ. Nat. Hist. i, p. 399 ♂ ♀. (1837.)

Female.—Head large, subquadrate, bluish-green or dark blue, finely and densely punctured, cheeks and vertex clothed with black pubescence, that on the face is long, somewhat dense and whitish, sometimes slightly mixed with black; anterior margin of the clypeus produced and deeply emarginate; mandibles stout, deeply channelled along the outer margin, and having a prominent tubercle on each side at base; antennæ longer than the head, black. Thorax bluish-green or dark blue, finely and densely punctured, clothed with rather long pubescence, which is whitish slightly mixed with black above and entirely black beneath; disk with a finely impressed longitudinal line; tegulæ black, smooth and shining. Wings subhyaline, almost hyaline, the apical margins and the costal half of the marginal cell tinged with fuliginous. Legs black, with black pubescence, that on the femora beneath sometimes pale. Abdomen subglobose, bluish-green or dark blue, rather densely and finely punctured, shining; the basal segment above and often the basal half of the second segment clothed with pale pubescence, the remaining segments with rather short black pubescence; beneath, the ventral scopa is dense and black. Length 4–6 lines.

Male.—Closely resembles the female, but is smaller and more parallel; the head is clothed with long white pubescence, that on the face being very dense; the antennæ are as long as the thorax; the anterior margin of the clypeus is smooth, shining and scarcely emarginate; the thorax beneath, except immediately under the base of the wings, and the legs, especially the femora beneath, are clothed with long white pubescence; apical margins of the sixth and seventh segments are entire, and the ventral segments have a rather long white pubescence.

Hab.—Conn., N. Y., N. J., Penn., Del., Va., and Kansas. Numerous specimens. Coll. Entom. Soc. Philad., and Mr. E. Norton.

A common species, and varies in color from blue to green and is even sometimes purplish; the most general color, however, being bluish-green. The deeply emarginate clypeus will readily distinguish the ♀ of this and the next species from all others known to me.

9. **O. propinqua**, n. sp.

Female.—Head large, subquadrate, as wide as the thorax, dark greenish-blue, densely and finely punctured, clothed with long black pubescence, which is mixed with ochraceous about the insertion of the antennæ; anterior margin of the clypeus strongly produced, and broadly, deeply and squarely emarginate in the middle, so as to leave on each side a rather long, stout, obtuse tooth, the outer face of the emargination black, smooth and shining; mandibles stout, black, deeply channelled with the apex deeply bifid; on each side of the extreme base of the mandibles a large smooth, shining tubercle, which has a deep impression posteriorly; antennæ black, rather longer than the head. Thorax blue-green, finely and densely punctured, clothed with long black pubescence, mixed with ochraceous above; tegulæ black, shining, punctured. Wings subhyaline, costal half of the marginal cell and the apical margins clouded; nervures blackish. Legs black, clothed with black pubescence. Abdomen subglobose, greenish-blue, shining, densely and minutely punctured; the two basal segments above clothed with long ochraceous pubescence, the remaining segments with rather short black pubescence; beneath the ventral scopa is dense and black. Length 5¼ lines.

Hab.—Fort Crook, California. Mr. H. Ulke. Coll. Entom. Soc. Philadelphia.

Closely resembles *O. lignaria* Say, but differs principally by the emargination of the clypeus being deeper and broader, and thereby making the tooth on each side much more prominent. It may be nothing more than a variety of that species.

10. **O. californica**, n. sp.

Female.—Head subtransverse, as wide as the thorax, densely and rather strongly punctured, black tinged with dark green, clothed with rather long black pubescence; clypeus more strongly and less densely punctured, prominent, convex, shining, with a smooth line down its middle, anterior margin rather deeply emarginate; mandibles robust, apical tooth long and acute, deeply channelled along the outer margin; antennæ black, scape shining, slightly tinged with green, flagellum beneath subsericeous. Thorax finely and densely punctured, black tinged with dark green, thickly clothed with long black pubescence; on each side above the tegulæ a very small smooth shining spot; metathorax tinged with deep blue; tegulæ black, shining, finely punctured. Wings hyaline, the marginal and first submarginal cells and the apical margins faintly stained with fuscous; nervures blackish. Legs black, punctured, clothed with short black pubescence, the tarsi beneath with short fuscous pubescence. Abdomen subglobose, minutely punctured, black, with a greenish-blue reflection, shining, rather thickly clothed with short black pubescence; beneath, the ventral scopa is dense and black. Length 5 lines.

Hab.—Fort Crook, California. Mr. H. Ulke. Coll. Ent. Soc. Philad.

Shaped like *O. lignaria* Say, but is at once distinguished from that species by the black pubescence and the shape of the clypeus.

11. **O. montana**, n. sp.

Male.—Head subquadrate, as wide as the thorax, densely and rather strongly punctured, deep blue, tinged with green anteriorly; face densely clothed with long whitish pubescence; the vertex has some long ochraceous, and the cheeks a rather long dense black pubescence; clypeus more finely punctured, anterior margin truncate, smooth and shining; antennæ as long as the head and thorax, black, flagellum piceous beneath. Thorax finely and very densely punctured; dark blue, opaque, clothed above with long ochraceous, and below with black pubescence; disk in front with a smooth shining longitudinal line and on each side of this line there is a very short impressed line proceeding from the anterior margin and extending obliquely inwards; tegulæ black and shining. Wings hyaline, nervures fuscous. Legs black, shining, clothed with black pubescence, the anterior femora beneath with long ochraceous pubescence; apical joints of the tarsi ferruginous. Abdomen subovate, deep blue, densely and finely punctured, the basal segment as well as a portion of the second segment, clothed with ochraceous pubescence, that on the basal segment long; remaining segments with short black pubescence; apical segment notched in the middle; beneath, the pubescence is black. Length 4½ lines.

Hab.—Pike's Peak, Colorado Territory. Two specimens. Coll. Entom. Soc. Philadelphia.

Resembles in form some of the males of *O. lignaria* Say, but quite distinct; the wings of the two specimens before me are purely hyaline.

12. **O. densa,** n. sp.

Female.—Head subtransverse, slightly wider than the thorax, dark green, slightly tinged with blue about the clypeus, densely and finely punctured, the punctures rather finer on the clypeus; the latter somewhat prominent, densely clothed with short black pubescence, with the anterior margin depressed, truncate, black, smooth and shining; vertex clothed with rather long fuscous pubescence, slightly mixed with ochraceous; mandibles stout, deeply channelled along the outer margin and armed with three short blunt teeth, the innermost one bifid; antennæ rather longer than the head, black. Thorax dark opaque-blue anteriorly, dark green with blue reflections posteriorly, very densely, confluently and rather strongly punctured, anteriorly the punctures are so dense and confluent as to appear granulate, on the scutellum and metathorax the punctures are finer; clothed with rather long ochraceous pubescence; disk of the thorax in front with a finely impressed longitudinal line, and on each side above the tegulæ a minute, smooth, shining spot; tegulæ blackish-piceous, slightly tinged with green, sparsely punctured, shining. Wings subhyaline, apical margin slightly clouded, nervures black. Legs black, shining, profoundly punctured, clothed with short black pubescence. Abdomen subglobose, densely and rather strongly punctured, dark green, shining, apical margins of the segments steel-blue, smooth and subdepressed; the basal segment above thinly clothed with ochraceous pubescence, that on the apical segment somewhat fuscous; beneath, the ventral scopa is dense and black. Length 4½ lines.

Hab.—Pike's Peak, Colorado Territory. Coll. Entom. Soc. Philad.

Easily distinguished from all others known to me by the very dense punctation, especially of the thorax. Much of the pubescence is rubbed off of the single specimen before me.

13. **O. frigida**, Smith.
Osmia frigida, Smith, Brit. Mus. Cat. i, p. 142, ♂ ♀. (1854.)

"*Female*. Length 5 lines.—Black, the head has an ochraceous pubescence, which is dense on the face, and sparing on the cheeks and vertex. Thorax, the disk thickly clothed with ochraceous pubescence, the femora have a thin fringe beneath of the same color, on the tibiæ and tarsi it is fuscous; wings subhyaline, their apical margins faintly clouded; the two basal segments of the abdomen thinly clothed with ochraceous pubescence; on the third, fourth and fifth it is black; the apical segment covered with very short ochraceous pubescence; beneath it is dense and black.

"*Male*. Length 3–4 lines.—The clypeus covered with long white pubescence, on the vertex and disk of the thorax it is long, thin and pale ochraceous; the base of the abdomen has a little scattered long pale pubescence, otherwise it is short, sparing and fuscous; the margin of the fifth segment fringed with brown pubescence; the sixth segment has down the middle a shallow longitudinal channel; the apical margin entire.

"*Hab.*—Hudson's Bay."

Unknown to me.

14. **O. bucconis**, Say.
Osmia bucconis, Say, Bost. Journ. Nat. Hist. i, p. 400, ♂ ♀. (1837.)

"*Female*.—Body black, with rather short gray hairs, and obvious, dense punctures: head rather large, long between the eyes and thorax: nasus entire: mandibles with a patch of dense prostrate hairs near the tip: wings hyaline: nervures fuscous; wing-scale piceous: tergum with short, blackish hairs; segments rather convex, narrow, white bands of prostrate short hairs, wider each side; towards the posterior extremity with numerous white, short hairs, obvious in profile; posterior tarsi with longer hairs, tinted with ferruginous; venter with fulvous hairs. Length over three-tenths of an inch.

"*Male*.—Resembles the female, but is smaller, and the tail has four distant denticulations. Length one-fourth of an inch.

"*Hab.*—Indiana."

I have not seen any specimens which answer to the above description.

15. **O. purpurea**, n. sp.

Female.—Head rather large, as wide as the thorax, dark purple. densely and finely punctured, thinly clothed with yellowish-white pubescence, which is longer on the sides of the face and cheeks, and short and sparse on the clypeus; anterior margin of the clypeus entire and fringed beneath with fulvous pubescence, the mandibles also clothed with short fulvous pubescence; antennæ short and black. Thorax dark purple. finely and densely punctured, clothed with yellowish-white pubescence which is paler beneath; tegulæ black, smooth and shining. Wings subhyaline, apical margin faintly clouded. Legs black, with short pale pubescence, tarsi beneath with fulvous pubescence. Abdomen subglobose, dark purple, slightly tinged with blue, densely, rather finely and confluently punctured, clothed with short, suberect, pale yellowish pubescence; on the basal segment and on the sides, the pubescence is rather long and whitish; the posterior margins of the second and three following segments are fringed with whitish pubescence, sometimes interrupted on the middle of the second and third segments; on the apical segment the pubescence is short, dense and whitish; beneath, the ventral scopa is rather dense and black. Length 3½—4½ lines.

Hab.—Conn., Penn., N. Jersey. Five ♀ specimens. Coll. Entom. Soc. Philad., and Mr. Edward Norton.

The dark purple color and the narrow whitish fasciæ of the abdomen of this species, will readily distinguish it from all others known to me. The whitish apical fringe of the abdominal segments are very conspicuous when held in certain lights, and also on the apex of the abdomen where the segments are more retracted.

The specimens before me of this species were labelled *O. bucconis* Say, but in that species the color is said to be "black," and the ventral scopa "fulvous"; but in the species before me the general color of the body is conspicuously dark purple, and the ventral scopa is black.

16. **O. sericea**, n. sp.

Male.—Head black with a slight blue-green reflection, densely and finely punctured; face thickly clothed with long yellowish-white pubescence, that on the vertex and cheeks long and sparse; antennæ about twice as long as the head, black, the flagellum beneath rufo-testaceous. Thorax black with a blue-green reflection, densely and finely punctured, clothed, especially on the sides and beneath, with rather long yellowish-white pubescence; tegulæ black, shining. Wings hyaline, apical margins faintly clouded, nervures black. Legs black with a slight greenish tinge, shining, clothed with short pale glittering pubescence; the tarsi beneath with yellow pubescence, the apical joints rufo-piceous. Abdomen rather short, subglobose, black faintly tinged with blue and purple, very closely, finely and uniformly punctured, densely clothed above with very short pale fuscous pubescence which has a pale sericeous appearance in certain lights; sides of the basal segment and also of the apical segments have the pubescence rather long and whitish; apical margin of the sixth segment sinuate on each side and rather deeply and obtusely notched in the middle; apical segment bidentate; beneath, the ventral segments are flat and fringed posteriorly with yellowish-white pubescence. Length 3¾ lines.

Hab.—Rocky Mountains, Colorado Territory. Coll. Ent. Soc. Phil.

Somewhat resembles *O. purpurea*, but the punctation of the abdomen is finer and the segments have no appearance of an apical whitish fringe which is more or less conspicuous in that species.

17. **O. simillima,** Smith.

Osmia simillima, Smith, Brit. Mus. Cat. i, p. 142, ♂ ♀ (1854.)

Female.—Head rather large, as wide as the thorax, bluish-green, densely and rather finely punctured, thinly clothed with whitish pubescence; clypeus more strongly punctured, apical margin truncate; antennæ short, black. Thorax bluish-green, densely and finely punctured, clothed with rather long whitish pubescence. Wings subhyaline, their apical margins faintly clouded. Legs black, with a short pale pubescence; the tarsi beneath with blackish pubescence. Abdomen subglobose, blue, tinged with green, polished, rather finely punctured; apical margin of the segments smooth; the segments above clothed with short whitish pubescence, that on the basal segment longest and that on the sides and on the apical segment more dense; beneath, the ventral scopa is dense and black. Length 4¾ lines.

"*Male.* Length 4 lines.—Head and thorax of a bronzed green, abdomen blue; the antennæ a little longer than the head and thorax, setaceous, fulvo-testaceous beneath; the face thickly covered with long white pubescence, a similar pubescence is also more thinly scattered over the vertex, thorax and base of the abdomen; wings as in the female; the apical segment notched in the middle; beneath, the ventral segment is bidentate."

Hab.—Nova Scotia; United States (Smith); Connecticut; Great Slave Lake, British America. Two ♀ specimens. Coll. Mr. E. Norton.

I have not seen the male of this species, and am somewhat uncertain that the female specimens from which I drew up the above description are the true *simillima* of Smith, as his description does not quite accord with the specimens I have examined.

18. **O. atriventris,** n. sp.

Female.—Head subquadrate, as wide as the thorax, dull blue-green, strongly tinged with blue about the clypeus, densely and somewhat finely punctured, clothed above and beneath with rather long white pubescence; anterior margin of the clypeus slightly and obtusely emarginate; mandibles black; antennæ rather longer than the head, black, the scape slightly tinged with green and the flagellum beneath with rufo-testaceous. Thorax dull blue-green, densely and finely punctured, clothed above and beneath with rather long white pubescence; disk in front with a finely impressed longitudinal line, and on each side above the tegulæ a small smooth shining spot; tegulæ black, shining. Wings subhyaline, faintly clouded; nervures black. Legs black, shining, thinly clothed with short pale hairs. Abdomen short, subglobose, dull blue-green, shining, densely and finely punctured, clothed with whitish pubescence, which is long on the basal segment, shorter on the sides and apex of the abdomen and very short on the segments above; beneath, the ventral scopa is dense and black. Length 4 lines.

Hab.—Connecticut. Two specimens. Coll. Mr. E. Norton.

Resembles O *simillima*, Smith, but is much smaller and the punctation of the abdomen much more dense and rather finer.

19. **O. dubia,** n. sp.

Female.—Head large, subquadrate, rather wider than the thorax, dark blue-green, clypeus deep blue, finely and densely punctured, rather thinly clothed with whitish pubescence which is slightly intermixed with fuscous on the face; clypeus deep blue, its anterior margin truncate; mandibles stout, black, channelled along the outer margin and armed with three teeth, the inner one blunt and bifid, the apical one rather long and acute; antennæ slightly longer than the head, black, shining, flagellum beneath tinged with rufo-testaceous. Thorax dull blue-green, densely and finely punctured, clothed with pale ochraceous pubescence, which is long above, and rather short and mixed with fuscous beneath; disk in front with a very finely impressed longitudinal line, and on each side above the tegulæ, a minute shining spot; tegulæ black, tinged with green, smooth and shining. Wings subhyaline, faintly clouded; nervures blackish. Legs black, shining, sparsely clothed with short fuscous pubescence. Abdomen short, subglobose, dark blue-green, shining, densely, finely and confluently punctured; basal segment above thinly clothed with rather long whitish pubescence, remaining segments with very short blackish pubescence, having a sericeous appearance in certain lights; beneath, the ventral scopa is dense and black. Length 4 lines.

Hab.—Pike's Peak, Colorado Territory. One specimen. Coll. Entom. Soc. Philadelphia.

Closely resembles *O. atriventris*, but the head is proportionally larger, the punctation of the abdomen is not so distinct, the pubescence not so dense and is of a different color on the abdomen above.

20. **O. distincta**, n. sp.

Female.—Head as wide as the thorax, dark greenish-blue, shining, densely and finely punctured; vertex and face thickly clothed with long pale golden-yellow pubescence, slightly fuscous on the vertex; anterior margin of the clypeus slightly iridescent, and somewhat emarginate; antennæ rather longer than the head, black. Thorax dark green with a slight bluish reflection, densely and finely punctured, thickly clothed with rather long hoary pubescence, anterior margin of the scutellum slightly impressed; tegulæ black, tinged with purple, smooth and shining. Wings almost hyaline, having a very faint tinge of fuscous; nervures blackish. Legs black, slightly tinged with green, shining, clothed beneath with short pale pubescence; tarsi beneath with fuscous pubescence. Abdomen short, broad, only slightly convex above, densely and finely punctured, blue-green, shining; basal segment above clothed with hoary pubescence, the remaining segments, especially the apical one, with very short pale sericeous pubescence; beneath, the ventral scopa is dense and white. Length 4 lines.

Hab.—Connecticut. One specimen. Coll. Mr. E. Norton.

Allied to the two following species, but is broader, more robust, with the abdomen shorter and only slightly convex above. It is distinguished at once from the three preceding species by its ventral scopa being white.

21. **O. albiventris**, n. sp.

Female.—Head as wide as the thorax, greenish-blue, shining, sometimes entirely deep blue; densely and finely punctured, clothed with long hoary pubescence; anterior margin of the clypeus truncate, depressed and shining; antennæ as long as the head, black. Thorax dark blue green, sometimes entirely deep blue, densely and finely punctured, thickly clothed with rather long hoary pubescence; tegulæ black, shining. Wings either hyaline or subhyaline, nervures black. Legs black, shining, clothed especially beneath with hoary pubescence. Abdomen ovate, dark bluish-green, shining, densely, very finely and confluently punctured; basal segment above thinly clothed with long hoary pubescence, the remaining segments with very short pale pubescence, that on the apical segment more dense; beneath, the ventral scopa is dense and white. Length 4 lines.

Male.—Resembles the female, except that the face is densely clothed with long hoary pubescence, the antennæ nearly as long as the thorax, and the legs and the abdomen above are more pilose. The apical margin of the sixth segment is entire, and that of the apical segment obsoletely notched in the middle. Length 3½ lines.

Hab.—Conn., New York, Penn. 8 ♀, 3 ♂ specimens. Coll. Entom. Soc. Philad., and Mr. E. Norton.

Distinguished from the next species by the much finer and closer punctation, especially of the abdomen.

22. **O. conjuncta**, n. sp.

Female.—Head as wide as the thorax, dark blue-green, densely and rather strongly punctured, shining, with a blackish opaque patch above the antennæ which disappears when viewed in certain lights, clothed with rather long pale pubescence, slightly intermixed with pale fuscous on the clypeus, the anterior margin of which is rather strongly emarginate; antennæ rather longer than the head, black. Thorax dull blue-green, densely and rather strongly punctured, clothed with whitish pubescence, which is more dense and longer on each side of the metathorax and on the pleura; tegulæ black, tinged with purple, smooth and shining. Wings fusco-hyaline. Legs black, tinged with blue-green, shining, clothed with pale hairs; tarsi beneath with a pale yellowish sericeous pubescence. Abdomen ovate, dark green, shining, rather densely, uniformly and somewhat strongly punctured, the punctures on the apical segment very dense and fine; segments above clothed with very short pale pubescence; beneath, the ventral scopa is dense and white. Length 4 lines.

Hab.—Connecticut. One specimen. Coll. Mr. E. Norton.

Resembles *O. albiventris* in size and form, but is distinguished by the punctation of the abdomen being much stronger and less dense; the punctation of the head and thorax is also stronger. The insect is much less pilose, but much of the pubescence has apparently been rubbed off.

23. **O. proxima,** n. sp.

Male.—Head green, densely and very finely punctured, clothed with rather long whitish pubescence, which is very dense and white on the clypeus; antennæ nearly as long as the thorax, black. Thorax dark green, densely and very finely punctured, thickly clothed with long whitish pubescence; tegulæ black, slightly tinged with green, smooth and shining. Wings hyaline, apical margin faintly clouded; nervures blackish. Legs green or blue-green, clothed with short pale pubescence. Abdomen green or blue-green, densely and very finely punctured, the apical margins of the segments above smooth and shining; sides of the basal segment above thinly clothed with whitish pubescence; the remaining segments with a very short sparse pale pubescence; the apical margin of the sixth segment is produced, reflexed and notched in the middle, and that of the apical segment is very deeply notched in the middle. Length 3½ lines.

Hab.—Maine and Fort Good Hope, Mackenzie River, British America. Two specimens. Coll. Mr. E. Norton.

Resembles the males of *O. albiventris*, but the apical margin of the sixth abdominal segment in that species is entire.

24. **O. canadensis**, n. sp.

Male.—Head green, finely and densely punctured, clothed with long white pubescence, which is very dense on the face; anterior margin of the clypeus smooth, black, with several small indentations and fringed beneath with white pubescence; antennæ rather longer than the head and thorax, black, joints of the flagellum somewhat flattened and contracted at base. Thorax green, finely and densely punctured, clothed with long whitish hairs; tegulæ black, shining, slightly tinged with green. Wings subhyaline, apical margins faintly clouded; nervures blackish. Legs rather long, green, punctured, clothed, especially beneath, with rather long whitish pubescence; tarsi beneath with pale fuscous pubescence. Abdomen oval, green, shining, densely and very finely punctured, apical margin of the segments above smooth and shining; segments above clothed with whitish pubescence, which is long and sparse on the basal and sides of the apical segments and short on the remaining segments; apical margin of the sixth segment slightly sinuate on each side and rather deeply and obtusely notched in the middle, and that of the apical segment bidentate; beneath, the ventral segments are flat, densely and finely punctured, shining and tinged with deep blue. Length 4 lines.

Hab.—Canada West. Mr. Wm. Saunders. Coll. Ent. Soc. Philad.

Differs from *O. proxima*, by the shape and greater length of the antennæ, by the legs being longer and by the more elongate form of the insect.

25. **O. cognata**, n. sp.

Male.—Head green, very finely and densely punctured; face thickly clothed with long whitish pubescence, the vertex and cheeks with a thin pubescence of the same color; anterior margin of the clypeus truncate, minutely denticulated and fringed beneath with white pubescence; antennæ as long as the head and thorax, black, joints of the flagellum subdepressed, contracted at base and tinged with rufo-piceous beneath. Thorax dark green, densely and finely punctured, thinly clothed with rather long whitish pubescence; tegulæ black, faintly tinged with green, smooth and shining. Wings subhyaline, nervures blackish. Legs black, tinged with blue and green, sparsely clothed with pale pubescence. Abdomen elongate, subovate, blue slightly tinged with green, shining, densely and minutely punctured, apical margin of the segments smooth and shining; clothed above, especially towards the tip, with short pale pubescence; apical margin of the sixth segment somewhat reflexed and rather deeply and obtusely notched in the middle, and that of the apical segment bidentate. Length 4½ lines.

Hab.—Illinois. Two specimens. Coll. Mr. E. Norton.

Larger than *O. canadensis*, from which it can be easily distinguished by the smoother appearance and blue color of the abdomen.

26. **O. fulgida**, n. sp.

Female.—Head subquadrate, about as wide as the thorax, brilliant green with blue reflections, finely and densely punctured, thickly clothed with rather long black pubescence; anterior margin of the clypeus black, truncate; mandibles stout, black, clothed with short black pubescence, armed with four teeth, the apical one rather long and subacute, the others short and blunt; antennæ black, scape green, finely punctured, tip of the flagellum beneath testaceous. Thorax finely and densely punctured, brilliant green, with bluish reflections, clothed with rather long black pubescence; disk longitudinally impressed in front, and on each side; midway between the disk and the tegulæ there is a very short, longitudinal impressed line which is black; metathorax more finely punctured, with a broad, deep depression on its disk; tegulæ black and shining. Wings subhyaline, apical margins clouded; nervures black. Legs bluish-green, clothed with short blackish pubescence, tarsi with fuscous pubescence. Abdomen subglobose, rather wider posteriorly, densely and minutely punctured, brilliant green, with bright blue reflections, polished, sparsely clothed with short black pubescence; basal segment in front deeply and longitudinally impressed; beneath, the ventral scopa is dense and blackish-fuscous. Length 4½ lines.

Hab.—Rocky Mountains, Col. Ter. One specimen. Coll. Entom. Soc. Philadelphia.

A very handsome species, having the colors remarkably bright and vivid. It resembles the next species but is more robust and somewhat differently shaped.

27. **O. viridis**, n. sp.

Female.—Narrow, elongate. Head subquadrate, as wide as the thorax, finely and densely punctured, brilliant blue-green, clothed with rather long black hairs, which are more dense beneath the antennæ;

clypeus, mandibles and antennæ as in the preceding species. Thorax densely and finely punctured, brilliant green with blue reflections, clothed with rather long black pubescence; scutellum and metathorax bright green, the latter deeply impressed on the disk; tegulæ black, smooth and polished. Wings subhyaline, apical margins faintly clouded; nervures blackish. Legs green, clothed with short black pubescence. Abdomen elongate, subovate, densely and minutely punctured, brilliant green, changing to deep blue in certain lights, clothed towards the apex with very short black pubescence; basal segment in front deeply impressed; beneath, the ventral scopa is dense and black. Length 4¼ lines.

Hab.—Rocky Mountains, Colorado Territory. One specimen. Coll. Entom. Soc. Philadelphia.

Closely resembles *O. fulgida* in color and punctation, but the form is more linear and not so robust; the abdomen is subovate and not subclavate as in that species. The color in both species is very bright and beautiful.

28. **O. pusilla**, n. sp.

Male.—Head dark blue-green, finely and densely punctured, clothed with pale hairs; anterior margin of the clypeus uneven; antennæ not as long as the thorax, black, flagellum testaceous beneath. Thorax dark blue-green, densely and finely punctured, clothed with long pale hairs; tegulæ green, smooth and shining. Wings hyaline, the apical margins very faintly clouded; nervures blackish. Legs blue-green, sparsely clothed with short pale pubescence. Abdomen elongate, subovate, dark blue, slightly tinged with green; shining, densely and minutely punctured, the apical margins of the segments smooth; the segments above clothed with whitish pubescence, that on the sides of the basal, and on the apical segments longer and more dense; apical margin of the sixth segment somewhat reflexed and deeply notched in the middle; apical segment bidentate; beneath, the ventral segments are flat, deep blue and pubescent. Length 3½ lines.

Hab.—Pike's Peak, Col. Ter. One specimen. Coll. Ent. Soc. Philad.

29. **O. pumila**, n. sp.

Female.—Head as wide as the thorax, deep blue, densely and finely punctured, clothed with rather long whitish pubescence; anterior margin of the clypeus truncate; mandibles stout, black, apical tooth long and acute; antennæ short, black. Thorax dark blue tinged with green, densely and finely punctured, clothed with long whitish hairs; tegulæ black, shining. Wings subhyaline, apical margins clouded; nervures fuscous. Legs black, sparsely clothed with short pale pubescence, the tarsi beneath with fuscous pubescence. Abdomen subovate, greenish-blue, shining, densely and minutely punctured, clothed with whitish pubescence, which is short and dense on the apical segments and long and sparse on the basal segments; beneath the ventral scopa is dense and white. Length 3 lines.

Hab.—Pennsylvania. One specimen. Coll. Entom. Soc. Philad.

Resembles *O. pusilla*, and may possibly be the ♀ of that species, although it is smaller.

30. **O. brevis**, n. sp.

Female.—Head large subquadrate, as wide as the thorax, deep blue, finely and closely punctured, clothed with long black pubescence, which is very dense on the clypeus, and slightly mixed with ochraceous on the vertex; clypeus prominent, anterior margin truncate; mandibles robust, deeply channelled along the outer margin, and armed with three teeth, the apical one long and subacute, the others short and blunt; antennæ about as long as the head, black. Thorax deep blue, finely and closely punctured, clothed above with ochraceous and beneath with black pubescence; disk in front with a finely impressed longitudinal line; tegulæ black, shining. Wings subhyaline, apical margins clouded; nervures blackish. Legs black, clothed with black pubescence. Abdomen short, subglobose, deep blue, finely punctured, shining; basal segment above thinly clothed with ochraceous pubescence; the remaining segments with a very short black pubescence; beneath, the ventral scopa is dense and black. Length 4 lines.

Hab.—Rocky Mountains, Col. Ter. Coll. Entom. Soc. Philad.

A short robust species, with the head nearly as large as the thorax.

31. **O. globosa**, n. sp.

Female.—Head subtransverse, black, densely, finely and uniformly punctured, sides of the face and the vertex clothed with long ochraceous pubescence, that on the clypeus short and black, about the insertion of the antennæ it is slightly mixed with fuscous; mandibles robust, deeply channelled along the outer margins and armed with three teeth, the innermost one bluntly bifid and the apical one long and acute; antennæ about as long as the head, black. Thorax black, closely and finely punctured, densely clothed with long ochraceous pubescence; tegulæ black, finely punctured, shining. Wings subhyaline, apical margins faintly clouded, nervures black. Legs black, clothed with blackish pubescence, the tarsi beneath, with fuscous pubescence. Abdomen short, globose and finely punctured, black, subopaque; basal segment above clothed, especially on the sides, with long ochraceous pubescence, the remaining segments clothed with short fuscous pubescence, which appears ochraceous in certain lights, especially on the apical segment; beneath, the ventral scopa is dense and black. Length 3¾ lines.

Hab.—Great Slave Lake, British America. One specimen. Coll. Smithsonian Institution.

A small robust species, remarkable for its short globose abdomen.

32. O. rustica, n. sp.

Male.—Head large, subquadrate, as wide the thorax, bronze-green, densely and finely punctured, clothed with long bright rust-red pubescence, which is dense and yellowish beneath the antennæ, that on the cheeks beneath pale yellowish-white; antennæ longer than the head, black. Thorax bronze-green, very closely and finely punctured, densely clothed above with long bright rust-red pubescence, beneath it is yellowish-white and rather thin; tegulæ brassy-black, smooth and shining. Wings hyaline, apical margins faintly clouded; nervures blackish. Legs greenish-black, clothed with rather long pale yellowish pubescence; apical joints of the tarsi rufo-testaceous. Abdomen short, globose, bright bronze-green, shining, finely and densely punctured, clothed above with bright rust-red pubescence, which is rather long on the basal segment, and dense on the apical margins of the segments, especially the terminal ones; apical margin of the sixth segment strongly sinuate on each side and rather deeply notched in the middle; apical segment bidentate; beneath, the pubescence is thin and pale. Length 3¼—3½ lines.

Hab.—Easton, Penn. Three ♂ specimens. Coll. Mr. E. Norton.

This is a beautiful little species; its form is short and robust, and may be at once distinguished from all other species known to me by its bright rust-red pubescence which is dense on the thorax and face, and the brassy-green color of the abdomen. The name I have adopted for this species was taken from specimens so named in the Harrisian Collection at Boston.

33. **O. vicina**, n. sp.

Male.—Head large, as wide as the thorax, green, finely and closely punctured, clothed especially in front with long pale yellowish pubescence; mandibles black, shining, deeply bifid at tip; antennæ black, nearly as long as the thorax. Thorax bronze-green, closely and finely punctured, rather densely clothed with long yellowish pubescence; tegulæ black, shining. Wings hyaline, apical margins faintly clouded; nervures pale fuscous. Legs green, clothed with pale pubescence; tarsi beneath with yellowish pubescence, the apical joints rufous. Abdomen elongate, rather broader posteriorly, dull bronze-green, closely, finely and confluently punctured, clothed above with pale yellowish pubescence, which is long on the basal segments and more dense on the apical margin of the remaining segments, especially the terminal ones; apical margin of the sixth segment slightly reflexed, obtusely notched in the middle, and entire laterally; apical segment bidentate; beneath, the ventral segments are flat and tinged with blue. Length 3¼ lines.

Hab.—Virginia. Coll. Entom. Soc. Philadelphia.

Allied to the preceding, but more elongate, not so robust, and entirely of a different color.

Descriptions of several new species of North American APIDÆ.

BY E. T. CRESSON.

Genus EPEOLUS, Latr.

1. **Epeolus bifasciatus**, n. sp.

Male.—Black, opaque. Head rather coarsely and confluently punctured, clothed about the insertion of the antennæ with appressed whitish pubescence; antennæ short, black, shining, the three basal joints, as well as the labrum and mandibles, rufous. Thorax deeply, roughly and confluently punctured, the punctures much coarser than those of the head; the tubercles, tegulæ and scutellum rufous, the latter having the lateral teeth prominent and subacute; anterior margin of the mesothorax rufous and clothed with dense, scale-like, ochraceous pubescence, as well as the margin beneath the scutellum; metathorax thinly clothed with short ochraceous pubescence; pleura shining. Wings fusco-hyaline, darker towards the tip and having a strong æneous or violaceous reflection; there is also a pale spot about the third submarginal cell; posterior wings hyaline at base. Legs rufous, the posterior coxæ and femora beneath and the tibial spurs and tarsal claws, black. Abdomen rather short, minutely punctured, the apical segments and the sides of the two basal segments clothed with very short cinereous pubescence; base of the first segment above with a broad band of ochraceous, scale-like pubescence which extends posteriorly on each side of the segment and is deeply indented on the disk in front; in a specimen where the pubescence is rubbed off, the surface is more or less rufous; posterior margin of the second segment above with a rather broad band of ochraceous, beneath which the surface is also sometimes rufous; the apical segment narrow and rounded at tip, the margins reflexed; beneath sparsely clothed with short cinereous pubescence, the apical segments with longer yellowish pubescence. Length 3¼ lines.

Hab.—Illinois (Mr. Walsh and Dr. Lewis). Two specimens. (Coll. Ent. Soc. Philadelphia.)

Genus **STELIS**, Panz.

2. **Stelis montana**, n. sp.

Female.—Head subtransverse, narrower than the thorax, densely and rather strongly punctured, dark olive-green, shining, clothed with black pubescence; anterior margin of the clypeus truncate; antennæ black, the scape tinged with green. Thorax densely and strongly punctured, dark olive-green, shining, clothed with rather long black pubescence, which is more dense beneath the wings; the mesothorax in front with a finely impressed longitudinal line, and on each side just above the tegulæ a short impressed longitudinal line; metathorax tinged with deep blue; tegulæ dark blue, closely punctured, shining. Wings subhyaline, costal half of the marginal cell fuscous; nervures black. Legs dark bluish-green, punctured, clothed with blackish pubescence. Abdomen subglobose, rather wider posteriorly, densely, strongly and confluently punctured, dark olive-green, shining, clothed above and beneath with rather sparse, short, black pubescence. Length 4 lines.

Hab.—Rocky Mountains, Colorado Territory. One specimen. (Coll. Ent. Soc. Philadelphia.)

This species probably belongs to the genus under which it is placed, as the maxillary palpi have but two joints, and the wings have the second recurrent nervure received a little beyond the apex of the second submarginal cell. The general appearance is similar to an *Osmia*, but the head is narrower than the thorax and the abdomen is without a ventral scopa.

Genus **XYLOCOPA**, Fabr.

3. **Xylocopa californica**, n. sp.

Female.—Head large, as wide as the thorax, black, slightly tinged with blue and green, especially on the cheeks, sparsely clothed with short black pubescence, that on the lower portion of the cheeks much longer; face flat, closely and confluently punctured, the punctures on the vertex stronger, those on the cheeks sparse; on each side of the face a deeply impressed longitudinal line commencing at the insertion of each antenna and ending on the lateral margin of the clypeus; on the middle of the clypeus a short, smooth, slightly elevated, longitudinal line, anterior margin truncate, smooth and polished; anterior margin of the labrum smooth, polished, with a small, square, emarginate process in the middle; mandibles smooth, polished, with a small patch of punctures near their base, the outer and inner margins channelled, the apex obtuse and slightly emarginate; the extreme lower orbits of the eyes, at the base of the mandibles, flattened, smooth and polished. Thorax clothed with rather dense black pubescence, closely and deeply punctured, except the disk above which is smooth, polished and without pubescence; beneath bluish-green, above black and on each side of the disk between the wings, where the surface is punctured, it is iridescent; middle of the mesothorax in front with a finely impressed longitudinal line which becomes obsolete before reaching the posterior margin; scutellum closely punctured, golden-green. Legs bluish-green, clothed with black pubescence. Abdomen dark-green, with a blue and purple reflection, polished, sparsely punctured, the sides of the apical segments more closely and deeply punctured; disk of the apical segment with two oblique pubescent carinæ, meeting posteriorly and diverging anteriorly; this segment, as well as the fifth, fringed with long, dense black, pubescence; beneath bluish-green, sparsely clothed with black pubescence. Length 11 lines.

Hab.—Fort Crook, California. Mr. Henry Ulke. (Coll. Ent. Soc. Philadelphia.)

Genus **BOMBUS**, Latr.

4. **Bombus consimilis**, n. sp.

Female.—Head black, with a tuft of yellowish pubescence on the vertex. Thorax entirely pale yellow, sometimes slightly tawny. Wings subhyaline, darkest along the apical margin. Legs black, with black hairs, those on the femora beneath more or less mixed with yellow; tarsi rufous within. Abdomen short, subglobose, the two basal segments pale yellow, sometimes slightly tawny; the apical segments black. sometimes the two apical segments are more or less mixed with yellowish; beneath black. Length 8—9 lines.

Hab.—Canada, New York, Massachusetts. Eight specimens. (Coll. Ent. Soc. Philadelphia.)

Colored same as *B. vagans* Smith, but is much smaller and more robust in proportion to the size. Mr. T. B. Ashton collected a number of this species, all females, early in the spring, in Northern New York, together with females of *B. vagans*, *fervidus*, *borealis*, *virginicus*, *pensylvanicus*, *separatus*, and *terricola.*

5. **Bombus centralis**, n. sp.

Female.—Head black, with a tuft of yellowish hairs above and below the antennæ and on the vertex. Thorax yellow above and on the sides, with a broad black band between the wings. Wings subhyaline, stained with fuscous, especially along the costa. Legs black, with black hairs; tarsi rufous within. Abdomen with the two basal segments yellow, with a rather large black patch on the disk above; the third and fourth segments pale orange-yellow; the apical segments black; beneath clothed with short yellowish pubescence. Length 8 lines.

Hab.—Fort Crook, California. One specimen. Mr. H. Ulke. (Coll. Ent. Soc. Philadelphia.)

Closely resembles *B. flavifrons* Cresson, but is rather more robust, and may be at once distinguished from that species by the black patch on the disk of the two basal segments of the abdomen above.

6. **Bombus borealis**, Kirby.

In my list of the N. A. species of Bombus (*Proc. Ent. Soc. Philad.*

II, p. 93), I referred to this species, with some doubt, a single ♀ specimen from Canada; since then I have received, through the kindness of Mr. William Saunders and Mr. T. B. Ashton, a fine series (♀, ☿ and ♂) of the true *borealis* of Kirby. The characters of this fine species are as follows:—

Female.—Head black, with the face and vertex clothed with pale yellowish pubescence, slightly tawny on the vertex. Thorax above densely clothed with bright tawny-yellow pubescence, with a broad black band between the wings; beneath entirely black. Wings fusco-hyaline, darkest along the apical margin. Legs black, tarsi pale without, rufous within. Abdomen above with the four basal segments clothed with bright tawny-yellow pubescence, the two apical segments black; beneath black. Length 8—9 lines.

Worker.—Colored same as the female. Length 6 lines.

Male.—Like the female and worker, except that the antennæ are as long as the thorax and setaceous, the sides of the thorax and the femora beneath are sometimes mixed with yellowish, the three apical segments of the abdomen above are more or less mixed with yellow and the last segment is tufted, the ventral segments are clothed with short pale yellowish pubescence. Length 7—8 lines.

Hab.—Canada (Saunders) and New York (Ashton). Coll. Ent. Soc. Philadelphia.

The males have much the appearance of some of the ♂ varieties of *Apathus elatus* Fabr., but they do not belong to that genus.

The single ♀ specimen which I supposed to be identical with this species, differs from the ♀ above described by having the abdomen above tawny-yellow, except the last segment which is black, and the ventral segments are clothed with short pale pubescence. It may be only a variety, and for the present it is probably best to consider it as such.

Genus **APATHUS**, Newm.

7. **Apathus Ashtoni**, n. sp.

Female.—Head entirely black. Thorax clothed above with pale yellowish, and beneath with black pubescence, on the disk above between the wings there is a mixture of black hairs and the scutellum is sometimes altogether black. Wings fusco-hyaline, darker along the apical margin. Legs black, with black hairs, tarsi within rufous, the apical joints exteriorly pale rufous. Abdomen black, smooth and shining, the posterior margin of the third segment above, broader laterally, the whole of the fourth and the extreme sides of the fifth segment densely clothed with yellowish pubescence, the remaining segments rather sparsely clothed with black pubescence; apical segment smooth and shining, without pubescence; in one specimen the basal segment above has a mixture of fuscous pubescence; beneath black. Length 8—9 lines.

Hab.—New York (Ashton); Maine (Packard); Canada (Saunders). Coll. Ent. Soc. Philadelphia.

Allied to *A. insularis* Smith. Mr. Packard informs me that there is a specimen of this species in the Harrisian Collection taken in Massachusetts. I have dedicated this fine species to my friend Mr. T. B. Ashton, of Washington Co., New York, who was the first to communicate it to me. I have not seen the ♂.

STATED MEETING, MAY 9.

President Bland in the Chair.

The Secretary read a letter from Mr. John Kirkpatrick of Cleveland, Ohio, transmitting to the Society pupæ of *Eudryas unio* in stems of *Hibiscus militaris*, which is abundant in wet swamps. Mr. K. says:—

> "The first time I found the pupæ was last spring (1863) in pieces of stem washed ashore. Last winter I visited the locality on the ice and found nearly all the dead stems of the above plant burrowed by the larvæ, and containing pupæ. In the burrows of the *Eudryas*, a friend of mine found a few pupæ of a dipterous insect and much resembling the pupæ of the Tachinæ that destroys the army worm. For many days last fall, there was a constant stream of butterflies passing over this city; occasionally hundreds would be seen at once, at other times only a few. They were all of one species—*Danais archippus*. Its food-plant is abundant here. The larva of *Sesia diffinis* feeds on the leaves of the Snowberry (*Symphoricarpus racemosus*) and also on those of the upright Honeysuckle (*Lonicera tartarica*) in gardens. Neither Dr. Harris or Dr. Clemens observed this. Three or four years ago I caught a specimen of *Argynnis columbina* on the Cuyahoga flats, and within half a mile of this city. I have compared it with specimens from Florida, in the Cabinet of Prof. J. P. Kirtland, and it in no wise differs from them. This is the only time, to my knowledge, it has been seen so far north. *Papilio cresphontes* was occasionally found here, but not since the cold winter of 1856-7."

The following letter was read from Mr. James Angus, dated West Farms, N. Y., April 15th, 1864:—

"A family of house-crickets have long been established in the house in which I live, but it is only of late that I have had my attention particularly directed to them. Harris says—"We have no house-crickets in America; our species inhabit gardens and fields, and enter our houses only by accident." Of course Dr. Harris must have been entirely ignorant of the existence of a house species in this country similar to those in Europe. Now I have no means of knowing whether this opinion is universal, or whether the discovery has ever been made that we have house-crickets in this country; but if such is the case. I think it will be found after an inspection of those I have lately captured in this house, to be an error. I have long been familiar to the creaking sound of these crickets, but thinking they had merely found their way there from the field, I never took any pains to find them out; but by mere accident one was caught a few days ago, and which, to my surprise and joy, proved to be an entirely distinct species from those inhabiting our gardens and fields, and having a close resemblance to, if not the same as, the European house-cricket of which I have got 2 poor specimens with which to compare them. They are light-brown with dark markings, not quite so large as the field-cricket (*Acheta abbreviata* Harris) and seems to be larger than its European representative. Like the latter its wings are very long, extending far beyond the wing covers. Perhaps this species is already known, but if not, it ought to be described, and for this purpose, if desired, I will gladly furnish specimens. Their haunts are very difficult to get at, and they are so shy and nimble that it is rather difficult to get them. I have only got so far 3 ♂ and 1 ♀."

The Secretary also read the following extract from a letter from Mr. A. S. Packard, Jr., dated Brunswick, Maine, April 28, 1864:—

"I was overjoyed to-day to find both a ♀ and ♂ *Stylops Childreni!* I took in my net an *Andrena placida* Smith, and just as it was nettled and I was about pinning it, I saw the ♂ *Stylops.* On comparing it with Westwood's figure and details in Griffith's Cuvier, pl. 49, I have but little doubt that it is that species, for it will be seen in Westwood's Classif. that the insect was brought over to London in an *Andrena* collected in Nova Scotia. The *Andrena placida* was stylopized also, fortunately, for I found a single female in the abdomen—that is, what I call a *female*—for it may be remembered that Westwood and others call it a larva, wherein they were corrected by Siebold. Now I have little doubt but that the ♂ *Stylops* was hatched from the body of some other *Andrena*, and flew upon the body of the Stylopized specimen which I caught, to 'have a consultation' with the ♀ escoused within. For this purpose the ♂ abdomen is very long and extensile, with two anal forceps capacious for seizing the female, and I have little doubt the anal tip is forced in to meet that of the ♀ which is perhaps not so entirely immoveable but that it can be bent around and outward somewhat. This I can tell by dissection of the *Andrena*. In Westwood's figure the abdomen is represented as being very short, but it must have been drawn from a dried specimen when the region was withered and much shortened. It must be that the ♀ ♀ are impregnated at this time, and that in the middle of June, as I have already observed, the viviporous young are hatched from the body of the parent. I do not see that the presence of this *Stylops* necessarily kills the bee or wasp, unless there are five or six individuals within the same bee-body."

The following papers were presented for publication :—

"Descriptions of several new N. A. Coleoptera, by Jas. H. B. Bland."

"Descriptions of N. American Lepidoptera, No. 3, by Aug. R. Grote."

"List of a Collection of Lepidoptera Heterocera, taken near Williamstown, Mass., by Aug. R. Grote."

"Synopsis of the Bombycidæ of the U. States, by A. S. Packard, Jr."

"Descriptions of North American Hymenoptera, by E. T. Cresson."

And were referred to Committees.

On report of the respective Committees, the following papers were ordered to be printed.

Description of several new North American CTENOPHORÆ.

BY BARON R. OSTEN SACKEN.

Five species were enumerated in my *Catalogue of the described diptera of North America*, under the head of *Ctenophora*. Subsequent investigations have proved that two of them, *C. fuliginosa* Say, and *C. abdominalis* Say, are true Tipulæ. *C. Parrii* Kirby, seems also to be a *Tipula*. The two remaining species *C. dorsalis* Walker, and *C. succedens* Walker, may perhaps be identified with two of the new species described below, although this identification, as will be shown, is by no means certain.

1. *Antennæ of the male with four rows of branches, the two larger ones on the outside, the two smaller ones on the inside ; antennæ of the female rather short, serrated ; male genitals clavate, but of moderate size ; female ovipositor short.*

C. nubecula n. sp. ♂ ♀.

Flavo-ferruginea, thorace ex maxima parte flavo, vittâ mediâ fuscâ, cuneiformi; alis subhyalinis, stigmate flavo, nebulâ substigmaticali majori, fuscâ.

Ferruginous-yellowish, thorax for the most part yellow, with a cuneiform, brown intermediate stripe; wings almost hyaline, stigma yellow, a rather large brown cloud close behind the stigma.

Long. corp. ♂ 0.55, ♀ 0.8; long al. ♂ 0.55, ♀ 0.62.

Head yellow, palpi yellowish, brownish towards the tip; front above the antennæ yellow; a black, triangular spot occupies the remainder of the front and the vertex. Thorax more or less tinged with bright lemon-yellow on the anterior part of the prothorax above and on the pleuræ: intermediate stripe brownish-black, triangular: lateral stripes brownish, very much abbreviated anteriorly. Halteres yellowish-ferruginous with a more or less distinct trace of lemon-yellow on the knob. Feet ferruginous: coxæ more or less tinged with lemon-yellow: anterior half of the femora somewhat paler than the posterior one (especially in the male). Tarsi dark tawny, two last joints blackish; in the female, the basal joints of the tarsi are lighter ferruginous. Abdomen brownish-ferruginous, with a more or less distinct, narrow, black dorsal stripe, generally interrupted at the incisures of the segments; posterior corners of the intermediate segments, on the back, as well as on the venter, more or less tinged with lemon-yellow. Wings subhyaline, a yellowish tinge along the anterior margin, which reaches as far as the stigma; a similar tinge along the fifth longitudinal vein: stigma yolk-yellow: a large brown cloud behind it, which on one side has a definite limit, formed by the cross-veins between the stigma and the discal cell; on the other side (towards the apex) there is no such limit, and the brown fades away gradually; this cloud does not touch the costal margin, so that there is a small hyaline space left between it and the stigma; posteriorly, the cloud covers the apical half of the discal cell and does not reach beyond the hind margin of this cell.

Male. Antennæ rather long (reaching somewhat beyond the root of the wing), with four rows of branches; the inner ones about half so long as the outer ones: the three basal (branchless) joints and the flagellum, except its extreme tip, are yellowish; the branches are brownish. The male genitals are clavate, but the club is smaller than that of the species of the following section; their color is brownish-ferruginous, blackish above.

Female. Antennæ hardly reaching the root of the wings, serrated, ferruginous-yellowish; upper valves of the ovipositor very short and, beyond their broad basal portion, abruptly narrowed and almost linear: their tip is rounded.

Hab. Illinois (Mr. Walsh.)

Observation.—I have seen in Dr. Harris's Collection in Boston, two female specimens of a *Ctenophora*, which, judging by the structure of their antennæ, seem to belong to this section. I reproduce here the short description made by me, at the time when I saw them.

C. apicata n. sp. ♀.

Whole body yellowish-brown, shining; some darker spots on the vertex and thorax; abdomen also darker, with the hind margin of one or two intermediate segments yellowish. Antennæ yellowish, rather short, subpectinated or submoniliform. Feet brownish-yellow, apical third of the middle and of the hind femora brown; tarsi infuscated towards the tip. Wings yellowish; apical part, posterior to the discal cell, tinged with brown.

Hab. Maine; New Hampshire.

2. *Antennæ of the male with three rows of branches; the third, intermediate one, is shorter than the lateral ones; antennæ of the female elongated, subfiliform; male genitals large, clavate; female ovipositor very long, sword-shaped.*

C. fumipennis n. sp. ♂ ♀.

Nigra, alis fuliginosis; ♂ abdomine pedibusque nigris; ♀ abdomine nigro, basi ferrugineo, pedibus ferrugineis.

Black, wings smoky black; ♂ with the abdomen and feet black; ♀ abdomen black, ferruginous at the basis; feet ferruginous.

Long. corp. ♂ 0.8, ♀ 0.11; long. al. ♂ 0.65, ♀ 0.8.

Head altogether black, with black hair. Antennæ of the *male* of moderate length, with three rows of branches, the intermediate branches short; the three first joints black, flagellum brownish with whitish branches or altogether whitish. Antennæ of the *female* longer than head and thorax together, basal joints black, flagellum more or less ferruginous, extreme tips of the joints black, terminal joints more or less infuscated, the first joint of the flagellum is but little shorter than the first antennal joint, the following joints of the flagellum gradually decrease in length; the four or five penultimate joints are subelliptical and of about equal length. The whole thorax black, shining; a whitish spot on the posterior end of the membrane between the collare and the root of the wings. Halteres with a blackish stem and a dingy whitish knob, or altogether blackish; abdomen of the *male* altogether black with large, club-shaped genitals; abdomen of the *female* black, the two basal segments ferruginous; the latter half of the abdomen is tapering and ends in a long, sword-shaped ovipositor. Feet of the *male* black, the foremost pair rather brownish; the foremost tarsi livid-brownish from the tip of the first to the base of the fourth joint; feet of the *female* ferruginous, coxæ and trochanters black; tarsi brownish, except the first and the root of the second joint, which are ferruginous. Wings uniformly brownish ferruginous, with a dark brown stigma. The second and third longitudinal veins are nearly parallel, only very slightly diverging towards their tip.

Hab. Virginia (Dr. Wilson.)

Observation.—One of the male specimens seen by me in the Cabinet of the Entomological Society in Philadelphia, has the basal two-thirds of the wings almost hyaline, and the apical third is less brownish than in the other specimens. There is also a small hyaline spot beyond the stigma. It is evidently only a variety.

C. topazina n. sp. ♂ ♀.

Nigra, vel ferruginea; abdomine plerumque flavo-ferrugineo, vittâ nigrâ; thorace vittâ laterali flavâ, pedibus ferrugineis; alis flavescentibus, stigmate fusco.

Black, or ferruginous; abdomen generally yellowish-ferruginous with a black stripe; feet ferruginous; wings tinged with yellow; stigma dark brown.

Long. corp. ♂ 0.7–0.75, ♀ 0.9–0.10; long. al. ♂ 0.65.

The coloring of the body is usually black, mixed with ferruginous, so that the black prevails on the thorax, the ferruginous on the abdomen, which, in most specimens, has a black, more or less extended, dorsal stripe. Among five males one had a black abdomen, the hind margins of the segments tinged with yellowish and some ferruginous spots on the sides of the two first, on the two last segments and on the club. When the thorax is black, there is a perceptible dull tawny spot above the middle coxæ and a dull reddish spot on each side of the metathorax. In some specimens, the reddish color prevails on the thorax so as to leave only three broad, black, shining stripes on its back. The only female which I have seen, had a ferruginous thorax, with the exception of dark spots on the pleuræ.

Antennæ of the *male* black at the base, flagellum grayish-brown in some specimens, yellowish-white in others, with three rows of branches, the intermediate one being the shortest. Antennæ of the *female* longer than head and thorax together; three first joints brownish, the following ferruginous, more or less tipped with brown; the proportion between the length of the joints is the same as in the female of *C. fumipennis*. On the thorax, the membrane between the root of the wing and the collare is bright yellow; the pleuræ have a slight grayish down. Halteres yellowish, their stem sometimes infuscated. Male genitals large, clavate; female ovipositor long, sword-shaped. Femora ferruginous, dark brown at the tip; fore tibiæ dark tawny, still darker towards the tip; middle and hind tibiæ ferruginous-tawny, darker at the basis and gradually infuscated towards the tip. Tarsi dark brown, the tip of the first joint and the three following joints of the foremost ones are pale grayish brown. (The only female specimen had altogether ferruginous feet, except the tarsi, which were brown, from the tip of the first joint.) Wings with a somewhat topazine yellowish tinge; veins brown; the interval between the costa and the first longitudinal vein more saturate yellow; stigma dark brown; its anterior portion sometimes paler; one of the males had a rather indistinct small grayish cloud, occupying the latter two-thirds of the discal cell and somewhat encroaching upon its surroundings; the extreme apex of the wing is also slightly margined with gray: the second and third longitudinal veins are nearly parallel and the distance between their tips is somewhat shorter than the distance between the tips of the third and of the following veins.

Hab. Virginia (Dr. Wilson.)

Observation.—I would take this species for *C. dorsalis* Walker, if it was not for the words: *feelers having alternate rows of long and short branches on each side*, which place Mr. Walker's species in the first section.

C. frontalis n. sp. ♂.

Ferruginea, capite nigro, abdominis segmentis 2–8 superne nigricantibus, alis hyalinis, stigmate fusco.

Ferruginous, head black, the segments 2–8 of the abdomen blackish above; wings altogether hyaline; stigma brown.

Long. corp. ♂ 0.6; long. al. 0.5.

Head black, mouth brownish, palpi brownish-yellow, their tip black; antennæ pale ferruginous; branches brownish gray, in three rows, the intermediate row being the shortest. Thorax ferruginous, shining above; hardly any vestiges of stripes are perceptible; the membrane between the root of the wings and the collare dingy-yellow. Halteres yellow. Feet pale ferruginous; tips of the femora slightly brownish; the extreme tips of the tibiæ, including the spurs, brown; tarsi pale brownish, the extreme tips of the 3d and 4th joints are brown; last joint dark brown. (The foremost feet are wanting in my only specimen.) Abdomen ferruginous, a black dorsal stripe of rather indefinite outline, begins at the second segment and ends at the base of the large, club-shaped male genitals, which are entirely ferruginous; this stripe occupies however only the middle of the dorsal segments, the sides of which are ferruginous. Wings altogether hyaline, even the space between the costa and the first longitudinal veins is without any tinge; veins yellow at the basis of the wings, black on the remainder of their surface; stigma brown; the 2d and 3d veins are distinctly diverging towards their tips, so that the distance between these tips is somewhat larger than that between the tip of the 3d longitudinal and of the following vein.

Hab. Massachusetts (Sanborn).

Observation I.—I possess an imperfect specimen of a female, which may belong to this species. Although the body is differently colored, the hyaline wings, yellowish at the basis, and the direction of the 2d and 3d longitudinal veins afford strong points of analogy. I incline to believe that *C. frontalis*, like *C. topazina*, varies in its coloring from black to ferruginous. I let the description of this female follow:

Head and thorax black, shining; palpi tawny at the base, the last joints black; antennæ brown; first joint black above; the third joint (first joint of the flagellum) is about half the length of the first, incrassated towards the tip on its upper side and therefore, clavate; fourth joint linear, somewhat longer than the third; the fifth joint also linear, about ¾ of the fourth; the 6th still shorter; the 7th and the following are subelliptical, the three penultimate joints subglobular. The membrane between the root of the wings and the collare is yellow. Halteres yellow. Fore coxæ black, clothed with pale hairs, their extreme tip and the trochanters ferruginous; middle and hind coxæ pale ferruginous, black at the extreme basis; femora ferruginous, the extreme tip brownish above; tibiæ dark tawny, paler on the inside; foremost tarsi dark brown; the first joint and the extreme basis of the second joint pale brownish. (The other tarsi, as well as the abdomen, are wanting.) Wings as in the male.

Hab. Ohio (Capt. Holden.)

Observation II.—It is not impossible that this is *C. succedens* Walk., although the description of this species in the *Diptera Saundersiana* is too unmeaning to admit of any conclusion, the more so, as Walker describes only the female.

Notes on some of the DIURNAL LEPIDOPTERA of the State of New York. with descriptions of their Larvæ and Chrysalides.

BY J. A. LINTNER, UTICA, N. Y.

The following pages are compiled from a series of Notes, extending over a period of seven years, during which time the writer was engaged in making a collection of the Insects of Schoharie, in Eastern New York, where he was then residing. Believing thorough explorations of limited localities to be of greater value to science, than the simple bringing together through exchange, of large collections, most of the work done, was without the knowledge of what had been achieved by others, and what additions were still needed, toward the completion of our Insect biographies. Through this neglect, now much regretted. many rare opportunities were lost, of adding materially, by additional observations and notes, to the number and value of the few new facts now presented.

The collection above referred to, numbers over two thousand species. of which about one-half are of the order of Lepidoptera. The Notes. with few exceptions, are of the Lepidoptera, and embrace descriptions more or less full, of one hundred larvæ.

PAPILIO TURNUS, Linn.

The earliest appearance of this butterfly, which I have recorded, is the 13th May. In a warm room I have had it emerge as early as December 9th. It is usually not very abundant. In 1856, not one came under my observation, but the year following it was so plentiful that toward the last of June it could occasionally be seen in companies of ten or twelve, settled upon damp patches of earth, after the manner of *C. philodice.* In 1858 it was as abundant as *philodice*—our most common species. The black variety, *glaucus*, does not occur here. I have very rarely captured the female, and in those which I have bred. the males have largely outnumbered the other sex.

The *larva* has been taken the middle of August on the Hop, resting on a slight web, spun by it on the upper surface of the leaf. An excellent description of it is given by Benj. D. Walsh, in Vol. I, p. 352 of these Proceedings.

The *chrysalis* is 1.25 in. long, yellowish, marked with brown on the wing-cases and most of the tubercles, and with a stigmatal brown line; head-case short, bifid, beaks diverging, corrugated, reflected externally, with two intermediate minute tooth-like projections; dorsal region to the ninth segment, ranging with the thoracic; thoracic projection slightly elevated, right-angled, with two small brown tubercles anterior to it; a single small humeral projection; margins of wing cases moderately angular; segments from the seventh to the twelfth inclusive, with two dorsal rows of small warty tubercles, two subdorsal rows of smaller, and a minute black point beneath each stigma,—the three terminal segments, carinated laterally beneath, and not ending in a spine.

PAPILIO ASTERIAS, Fab.

First appearance of *butterfly*, May 6th; within doors, in a warm room, December 13th. The middle of June, it may be seen depositing its eggs, singly, upon the leaves of the parsnip, caraway and other umbelliferous plants.

The *eggs* are of a delicate light yellow, smooth and round, with the exception of being slightly flattened where they are attached to the leaf.

The mature *larva* is well known. The young larva is nearly black, and very unlike its appearance after its last molting, at which time it assumes its green color.

Chrysalis 1 in. to 1.10 in. long; head case long, with beaks nearly parallel—otherwise as in *turnus;* thoracic projection brown, moderately elevated, descending perpendicularly in front; middle dorsal region, depressed,—the ventral region opposite, correspondingly convex; dorsal and subdorsal tubercles in number and arrangement, as in *turnus*, but larger, approaching to spines; wing cases projecting at their posterior angle; terminal segments beneath, as in *turnus*. (Described from dead chrysalides, and the coloration consequently omitted, as in several of the following species.)

PAPILIO TROILUS, Linn.

This is one of our most rare diurnals, and I am only acquainted with its imago. I have taken it twice, the middle of June, resting on damp ground; others have been reported to me, in a neighboring locality, where its food plant, *Laurus Sassafras*, is found.

Pieris oleracea, Harris.

This butterfly, until recently, has been extremely rare in this place. Previous to 1857, I had taken it but once during the three preceding years. At present, in numbers, it ranks second to *C. philodice*. It is usually seen flitting about gardens, and in the streets, alighting occasionally upon damp spots of earth. It commences its daily flight at an earlier hour than any other species—often before seven o'clock—and is seen abroad until quite late in the afternoon.

There are *three* broods of this butterfly during the year. Of the *first* brood, I have taken individuals as early as the 18th of April. About the 10th of May they are abundant; a month later none are to be seen.

The *second* brood appears about the 1st of July, varying from this period, by a week earlier or later, as the season may influence their development.

The middle of August, a *third* brood makes its appearance. During the last week of August and the first week of September, they are very numerous, more so than at any other time of the year. At any moment during the day one or more individuals may be seen on the wing. My notes show, that for two years, this brood consisted only of those which had the posterior wings simply tinged with yellow, without the conspicuous black veins. Is this uniformly the case? So far as I am able to recall, both those which I have bred and captured of the first brood, have had the black veined yellow posterior wings. It will be interesting to determine by further observations, whether these differences in the successive broods really exist.

About the 10th of October, the last of the brood are seen flitting about, with denuded and broken wings. By this time nearly all the larvæ have matured, and their chrysalides may be found suspended beneath boards, or under shelter of the grasses growing beside garden fences in the immediate vicinity of oleraceous crops.

From the marked variations in color, presented by this species,—the inferior surface of the posterior wings in some, having but the slightest tinge of yellow, and in others, being of an orange yellow, with conspicuous black bordered veins,—authors have been led to separate it into distinct species, or at least into permanent varieties. Although varying so much in appearance, there can be but little doubt that they constitute but a single species. Collections have been made, in which the extremes are connected by every gradation of shade. But it is probable that any number of individuals, collected from one locality, at one particular time, will present a very limited range of variation. In the earlier years of its appearance in this place, those taken, with very few exceptions, were nearly immaculate; none were found having the black veined yellow posterior wings, which during the last few years have been so plentiful.

I had hoped to institute a series of experiments and observations, on the variations which this species offers, with a view of determining as far as practicable, the following points, some of which had been suggested for my study, by correspondents:

a. The range of variation existing in the brood of a single ♀.
b. The modification of variation, from the union of ♂ and ♀ of the same style of variation.
c. Ditto of different styles of variation.
d. Ditto of the extremes of variation.
e. Variation as modified, by the food-plant.
f. Ditto by the impeded development of the larva by cold.
g. Ditto by the impeded development of the chrysalis.

My attempts were as follows. I gave a ♂ and ♀ which had emerged from chrysalis the same day, the freedom of a large, well lighted apartment, in which had been placed sugar and water for their food, and thrifty potted plants of horse-radish, cabbage, &c., for the ♀ to deposit her eggs upon. They were found dead after the lapse of a few days; no eggs had been placed on the plants, and they probably had not mated.

I took pairs in coitu, and treated them as above, with the same result.

I captured females while depositing their eggs, and furnished them with plants as above, but no eggs were found upon them.

I inclosed in boxes, ovipositing females, with distended bodies; result as before.

It will be seen from the above, that all my efforts to pair the species, or induce it to deposit eggs under the slightest restraint, were in vain. I trust that others who feel an interest in the subject of the variation of our diurnals, may be induced to prosecute its study, experimentally, and that some method may be found of overcoming the difficulties which have presented themselves. I would be pleased to have communicated to me any instance of the successful pairing of any of our butterflies.

Although so abundant at Schoharie, *oleracea* is not generally distributed over the State. In leaving the valley, it diminishes in frequency as we ascend the surrounding hills. At Utica not one individual came under my observation during last year, while at Oswego, in the month of August, I found it very numerous.

The *larva* is .9 in. in length; tapering toward the extremities from the 6th and 7th segments; head small, rounded, flattened anteriorly, of the diameter of the 1st segment; segments with six transverse wrinkles; incisures rather deep. Color of the head and body, apple-green; a lighter green stigmatal stripe, becoming whitish just before the change to chrysalis; an indistinct vascular line; body and head covered with numerous short hairs, giving it a downy appearance,—those beneath, white—above the stigmatal line, black mingled with the white, arising from minute black papillæ; stigmata broadly oval.

Chrysalis, attached by its tail, and suspended by a girt about its middle; quite angular; head with a single point; thoracic projection, prominent, compressed laterally, apex rounded; the two lateral projections, margining the wing-cases, sharp; abdomen, slender, pointed, rounded beneath, with dorsal and lateral carinations. Color white; wing-cases, with brown linings, a brown irregular spot near the tip, another near the base, and black points on the nervures and on the margin intermediately; a black spot in front of each lateral projection; a short black line on the thoracic projection anteriorly and posteriorly; the segments superiorly, each with a brown cloud above their lateral carination, and regularly dotted with black, as follows: four dots (divided by the dorsal carination) posteriorly, forming a parallelogram—four in a transverse line, nearer the anterior portion, and two still nearer together, farther removed from the dorsal carination,—the ten dots arranged in a W nearly.

COLIAS PHILODICE, Godt.

I have seen this butterfly abroad as early as April 30th, and as late in the year as November 4th. As with *oleracea*, there are, in all probability, *three* broods each year, for after its first coming it continues constantly with us, until its final disappearance. It is only in the Fall that it can be seen collected on damp earth by the road-side, in companies of hundreds, when as many as twenty can frequently be taken at one sweep of the net, and thousands driven up in a few minutes walk.

The white variety of the ♀ is not very rare in this locality, although recorded as rare by authors, for a year has seldom passed without giving me one or more. In 1858—a year remarkably prolific in insect life—I took six in a single field, in less than an hour's time. I have in my collection, one, in which the black border of the primaries is without the spots which characterise the ♀,—and one in which the secondaries have on their inferior surface, but a single discoidal silvered spot.

Extremely abundant as is this species, I am unacquainted with its larva, but it could no doubt be readily obtained from clover fields, by the aid of a sweeping net.

GRAPTA COMMA, Harris.

The *larva*, a short time before its final motling, is whitish, with pale green or blue markings. Subsequent to its molting, the three posterior wrinkles of each segment, the lateral flexures, the abdominal spines (except their tips, which are black) and a spot at their base, gradually change to a cream-color, as the larva approaches maturity. The six posterior segments have each a small orange spot above the stigma,—those of the 6th and 11th segments, sometimes quite minute. The dorsal markings in blue or bluish-green are as follows: on the vascular line, a short line extending backwards from the front of each segment, half-way to the dorsal spine; on either side, a curved line, commencing anteriorly near the front of the segment, in range with the sub-dorsal spines, passing with a double flexure, obliquely toward the rear of the dorsal spine, just behind which the two lines are united by a short transverse line; within these lines, midway between them and the vascular line, are two short dashes on the anterior of the segment, directed obliquely toward the dorsal spine. Head, flesh-color, thickly studded with white spines, the longest of which are black tipped, and terminate in a bristle; the two tubercles, of the color of the head. Stigmata, broadly oval, black, shining under a lens. Legs, bright red; pro-legs flesh-color.

The larva suspends itself by its terminal legs, and assumes its chrysalis state twenty-four hours thereafter. The butterfly emerges after twelve days.

The *chrysalis* is from .75 in. to .95 in. long, marked with six golden dorsal spots at the bases of the anterior spines,—reticulated with grey and white, and brown striped below the stigmata; head-case, with two lateral projections, short, conical, quite acute; a prominent thoracic spinous projection, compressed laterally, beneath which, on each side is a tubercle; two humeral projections, the anterior one, subconical,—the posterior, elongated; inferior wing-cases, with a prominence near the hind margin, on the sixth segment, parallel with the posterior humeral projection—the wing-case intermediately, deeply depressed; two dorsal rows of spines, from the third to the tenth segments inclusive, short, except those of the seventh segment, which are thrice the size of the others; terminal spine, long, flat, slightly curved.

The above larval description is from ten individuals, taken on the Hop, between the 10th and last of August. At the same time, one was taken, differing so much in coloration, as to deserve a separate description. Larva, light yellow; above the stigmata, a black stripe, in which is the row of spines with the orange spots at their base—the stripe in its breadth reaching nearly up to the subdorsal row of spines, and sending off, on each segment, the double curved line above described; the short vascular line is also black; the lateral row of orange spots has one spot on the 5th segment, making their number seven,—those from the 6th to the 11th inclusive, are double, the additional spot being behind the spine, lower on the body than the other, and of smaller size. Head, shining black, with stiff hairs and two branching spines, whitish. Body beneath, blackish. Spines, except of the substigmatal row, cream-color, with black tipped whitish branches; trunk of the two lateral spines of the 2nd segment, black. On the three anterior segments, a whitish median line. Stigmata black. Legs red.

The butterfly obtained from the above larva does not differ materially from other specimens of *comma* in my possession. These are the principal variations noticed: the large black spot resting on the anterior margin of each wing, is larger; the two black spots situated between the nervules of the sub-median of the primaries, are smaller—

the brown spot at their posterior angle is more distinct; the six orange marginal spots of the secondaries, are brighter.

I deem it probable that we still have at least two species confounded in *comma*,—the determination of which will require close observation, and such particular larval descriptions as I have endeavored to give above.

The female has the wings less emarginated than the male. With the two side by side, a casual glance at the broad and short tail of the secondaries of the former, and the longer and more slender tail of the latter, will serve to designate the sexes. This difference is observable, though to a less extent, in the other species of this genus. Another obvious sexual characteristic of Grapta, is, the long hairs which clothe the anterior pair of legs of the male.

I have captured this *butterfly* earlier than any other species,—flitting about in the warm sunlight of a spring-like day, on the 2nd of March. Although but slightly worn, it had undoubtedly been drawn out from its winter quarters.

The first brood makes its appearance in June. Its larva will probably be found on the Elm, during the preceding month. Of the second brood, from the Hop, I have had them from chrysalis, from the 25th of August to the 5th of September.

GRAPTA FAUNUS, Edwards.

This species is of much more rare occurrence in this locality than the preceding. Among the Adirondack Mountains of this State, near Raquette Lake, in the month of August, I once met with a large gathering of them, upon a small spot of moist earth. Usually extremely shy as are all the Graptas, my approach startled only a few of their number, which, after a short circuit, returned to their repast. I experienced not the least difficulty in capturing twenty or more by hand, although another collector had preceded me—a large toad (*Bufo americanus*)—whom I found holding a central position in the group, and earnestly engaged in lapping up with his broad tongue, one after another of the company, with the greatest dexterity, seldom missing an attempt. After watching for some minutes the novel performance, I left him still gorging himself upon what I should judge to be unusual Batrachian diet.

GRAPTA PROGNE, Fab.

Larva, reddish grey; spines white, with branches, some of which are black tipped; tubercles from which the spines proceed, light red; on each segment two or three black bands posteriorly, and four short black dorsal lines, extending obliquely from its anterior edge, across one-third of its extent—the two inner ones directed toward the crossing of the vascular line by the incisure—and the two outer ones toward a point on the following segment. Prolegs, black exteriorly. Head small, strongly spined. Length 1.25 inches.

While feeding, the larva detaches its terminal legs from the leaf, and curves upward its last two segments. I have taken it on the wild Gooseberry (*Ribes rotundifolium*) and on the Currant (*Ribes rubrum.*) In chrysalis, June 13th—20th; emerges from chrysalis after twelve or thirteen days.

Chrysalis, .85 in. long; head-case prolonged in two parallel obliquely truncated horns, forming a full U—their tips maculated with brown; thoracic projection, not prominent; dorsum, slightly depressed, and its spines almost obsolete; humeral projections as in *comma;* wing-cases, with a blunt projection near their posterior margin, and deeply excavated centrally; terminal spine, long, rounded, moderately curved.

The *butterfly* probably hybernates. I have taken worn and faded ones, early in May, which had doubtless survived the winter. A few may be disclosed from chrysalis in the spring. Dr. Fitch gives July as the time of its appearance, and limits it to a single brood; he records as worthy of note, that Dr. Harris had obtained it as late as the 18th of August. I have captured it fresh and just from chrysalis, the 7th of September—clearly establishing the fact which would naturally be expected from its close relationship to *comma*, of *two* annual broods. Toward the last of September and early in October, it may frequently be seen, regaling itself upon the juices of fallen pears and other fruit, in company with *interrogationis.*

GRAPTA J.ALBUM, Godt.

Larva, two inches long, light green; head with black markings on the sides—thickly set with setæ and with short spines, of which the lateral ones are each tipped with a long seta—and armed with two shining black, thick spines, verticillated near the tip; the dorsal and subdorsal rows of spines, shining black, except at base, which is rufous, with long branches—those of the anterior segments more numerously branched than the others, and having each point tipped with a seta; the super- and sub-stigmatal rows, rufous, tipped with black.

Chrysalis, one inch long—of a beautiful green, delicately reticulated under a lens—with six golden dorsal spots; head-case, with conical beaks, less projecting and acute than in *comma;* thoracic projection elevated in a compressed, slightly recurved beak, similar to *comma*, and tipped with black anteriorly; dorsal spines, prominent—the superior one, about double the size of the others; wing cases, moderately depressed—the humeral projections prominent—that near hind margins on sixth segment, moderate; stigmata brown, with a brown spot beneath, centrally on the segment; terminal spine broad, flat, deeply excavated beneath, and bordered with brown.

I have taken the larva but once. When captured, it was fully matured, and crawling rapidly over the ground of a dense grove of varied timber, and I am therefore unable to give its food-plant. It changed to a chrysalis the 27th of June, and emerged after thirteen days.

The spinous head of the larva justifies its removal to the genus where I now place it, and where the silver character of the posterior wings naturally locates it. Its marginal series of crescents of green scales beneath (connected here in a band), the inner row of minute black dots, and the dentated markings of the basal region—are well known characteristics of the Graptas; while the contracted silver marking, reduced frequently to a mere dash, the wings less emarginate, and palpi more hairy,—show it to be the nearest allied of its genus, to Vanessa.

The *butterfly* is quite rare. It hybernates, and is occasionally found, in the winter season, within old buildings, where it had taken shelter. The first warm days of March draw it from its retreat. In September a second brood appears, a portion of which pass the winter in chrysalis.

VANESSA ANTIOPA, Linn.

Larva, two inches long; velvety black, with whitish dots in transverse bands, from which proceed short whitish hairs; vascular line, black, interrupted by eight or nine red spots. usually of a triangular form, having a spine at the apex, and one (subdorsal) in each side. Head, somewhat cordate, black, with a few small shining black tubercles, and whitish hairs. Abdominal spines, long, black, with a few black branches and whitish setæ, and arranged as follows: none on the first segment; on the second and third segments, four each—the subdorsal ones exceeding all the others in length; on the fourth segment, six spines; on the remaining segments, seven each; those of the substigmatal row have, in some instances, a dull red spot at their base above: the spines are not in a transverse line—the dorsal one occupying the anterior of the segment, the substigmatal one the posterior, and the subdorsal and superstigmatal ones in range intermediately. This arrangement of spines is uniform in all the Vanessas. Legs, black; prolegs, fulvous; stigmata barely discoverable even under a lens, except when bordered, as sometimes, with whitish.

Chrysalis, 1 in. in length; beaks of head-case, short and conical; thoracic projection of medium height, nearly ranging anteriorly with the frontal beaks; dorsal spines, long, quite acute, and excepting the last, nearly equal; anterior humeral projection, elevated, acute; wing cases, slightly depressed, and with a very moderate projection on the inferiors; terminal spine, short, flattened and quite broad.

The *butterfly* frequently hybernates, and has been seen abroad the 23d of March. It has *three* annual broods. The *first*, from the chrysalides of the Fall brood, appears in May. The *second* brood is seen the latter part of July. A colony of larvæ, numbering about thirty, which I took on a small twig of Willow, early in July, after undergoing their last molting, were found on the morning of the 14th, to have suspended themselves during the night, preparatory to their change; at the close of the day they had all assumed the chrysalis state. In eight days thereafter the butterflies emerged. Of the *third* brood, I have obtained chrysalides the middle of September, and the butterfly the 1st of October, after sixteen days—a longer time being required for the change, at this period of the year. A portion only of the chrysalides of this brood—those which were the first to reach that stage, or such as may have had positions more favorable for their development,—disclose their butterflies at this unfriendly season, when the cold autumnal winds so soon compel them to shelter themselves in winter retreats.

An interesting peculiarity of this species—not observed by me in any other diurnal, and not to the same extent among the nocturnals where it is of frequent occurrence—is its habit of counterfeiting death. When newly emerged, within the breeding cage, it may be taken between the fingers, without the slightest show of resistance; at the first touch it folds up its legs and becomes seemingly inanimate. Released from the hand, it drops upon its side, and will even allow itself to be tossed from side to side without attempting flight. If left undisturbed for a short time, it slowly raises itself, and simply resumes its upright position.

This species varies much in size. I have it from two inches, to three and a half inches spread of wings—the former doubtless dwarfed from insufficient food.

VANESSA MILBERTI, Godt.

Larva, length 1.10 in.; anterior segments quite tapering; head small, with short hairs proceeding from minute whitish granulations; body black, with granulations like those of the head, and with rufous dots sometimes coalescent, as on the back, where they margin a black vascular line, and anterior to each subdorsal spine, where they form a curved spot; between the stigmata, a connected series of rufous crescents—each crescent convex above, extending from the lower portion of one stigma to the upper part of the following; below the stigmata, a rufous stripe; ventral region, yellowish; legs, black; prolegs, rufous, anterior to each pair of which is a quadrangular brown spot; spines clothed with delicate setæ,—the dorsal, subdorsal and superstigmatal rows, black, and the substigmatal, rufous. (The color of the crescents and dots is taken from an alcoholic specimen.)

Chrysalis, .8 in. in length, slightly angular: frontal beaks, short, conical; thoracic projection forming nearly a right angle; dorsal spines, but little elevated—the superior one exceeding very little the others in size; wing-cases, as in *antiopa;* terminal spine, short, flattened, curved.

I have no knowledge of more than two annual broods of this butterfly. It makes its appearance very early in the spring. I have taken the sexes, somewhat worn, *in coitu*, on the 13th of March,—and on April 7th those which, without doubt, had been newly disclosed from chrysalis. A *second* brood appears about the middle of August, after having passed ten days in chrysalis. The larva is usually very abundant on the common Nettle (*Urtica dioica*), growing by the roadside,—a very large number frequently clustering on a single plant. Although so numerous, comparatively few pass beyond the larval state, the larger proportion falling victims to the parasite peculiar to it. Of twenty-five larvæ, which I placed in my breeding cage, only five became chrysalides. From the body of each of the others when full grown, a number of grubs emerged, and spun themselves up in small white cocoons, placed with perfect regularity side by side, forming a compact bundle, usually round in form, made up of from twenty to sixty cocoons—the whole enveloped in a cotton-like substance. The cocoons are in every instance spun underneath the larva, to which they are attached by the sides of the lower layer, instead of by their base, as they commonly are; as the mass increases, the body of the larva above it, is raised up from the leaf or stem on which it rested, embracing the bundle in its curve.

The larva presents us with an instance of great tenacity of life. Although every portion of its body had been honeycombed by the escape of the large number of parasites which it inclosed—sufficient, one would suppose, to produce speedy death—I have known its life to be prolonged for a period of seven days thereafter.

LIMENITIS ARTHEMIS, Drury.

Larva, whitish, with small blue dots; protuberances, terminal segments and under side, olive green. Head, cordate, tuberculated and spined. Body, on the second segment, with two branching spines; on the third and fifth, each, two protuberances; on the eighth, two tubercles with elevated radii; on the ninth, two similar, but larger; on the eleventh, four spinous tubercles. Feeds probably on the Balsam Poplar (*Populus balsamifera*), beneath which the larva was found, fully grown.

Chrysalis, 1.10 in. long; whitish, with margin of wing-cases and dorsal projection greenish—the latter silvery on its sides. Head-case, square, with two short, blunt, diverging horns; thoracic carination rounded, slightly elevated above the following segment; dorsal projection, compressed laterally, quite prominent, forming nearly three-fourths of a broad oval; margins of wing-cases quite angular; central segments nearly cylindrical—terminal ones contracted abruptly; terminal spine, short and broad.

As it hangs suspended, it frequently turns from side to side, and very seldom rests perpendicularly. It becomes a chrysalis after the larva has been suspended thirty-six hours, and emerges nine days thereafter.

I have taken the *butterfly* the last of June. It is usually quite rare, but on one occasion I met with a number of them, in a sheltered roadway in a wood, on elevated ground, sporting in the bright sunlight, with short and rapid flights. When it alights on a tree, it seldom remains stationary, but continues walking over the leaves, opening and folding its wings.

LIMENITIS DISIPPUS, Godt.

The *larva* has a marked resemblance to that of *arthemis*, and cannot readily be distinguished from it, unless by actual comparison. The green upon it varies from a pea-green to a darker shade, but is never so dark as in *arthemis*.

I have found the larva on the Gray Willow (*Salix grisea*) in July. Several willows which I examined during a walk, on the 28th July, gave me each one larva or more, in different stages of maturity, from the second molting, to full grown. Their position was at once revealed by the twig upon which they had fed—usually the top one—having been entirely defoliated, from its tip about eighteen inches downward, leaving only the footstalks of the leaves remaining. I have also taken it on the White Poplar (*Populus tremuloides*), to the number of five on one small bush.

The *chrysalis* resembles closely that of *arthemis ;* the dorsal projection is smaller and more elliptical in outline; the depression between it and the thoracic carination, deeper; head-case nearly square in front.

The *butterfly* emerges early in August, after eight or nine days in chrysalis. I have also captured it early in May, appearing as if it had survived the winter.

PYRAMEIS HUNTERA, Sm. Abb.

Larva, head and first segment without spines; body with rows of black branching spines—brown, with delicately lined bands (yellow, Abbott, black, Fab.) on the anterior of each segment; two dorsal rows of seven white (white and red alternately, Abbott) dots. Changed to chrysalis Sept. 3rd.

Chrysalis, suspended by the tail, yellowish; moderately angular; head-case, bifid, slightly projecting, and edged with brown above;

thoracic projection forming an obtuse angle; dorsal spines minute, of nearly uniform size, brown tipped; segments with rows of brown dots, and also of brownish markings. Imago emerges in ten days.

The *butterfly*, usually rare, is met with abundantly some years, flying about clover fields, with the short and rapid flight of the Skippers. It is the most numerous about the middle of September. Several years ago, prior to my collecting, I observed at the Adirondack Iron Works in this State, immense numbers of either this species or *cardui*, upon and about the blossoms of the common thistle (*Cirsium lanceolatum*) growing by the road-side. So abundant were they, and so little disposed to flight, that any desired number, could in a short time, have been taken by hand. I have also captured *huntera* on the summit of Mt. Marcy.

The following are the dates of capture of some of our Diurnals, with note of rarity subjoined:—

Pieris protodice, Boisd.	Sept. 4th.	Taken once only.
Danais archippus, Sm. Abb.	Aug. 4th.	Varies in different years.
Argynnis bellona, Fab.	May 13th	Not rare—local—in swamps.
" *aphrodite*, Fab.	June 23rd.	Common.
Pyrameis atalanta, Linn.	May 8th.	Abundant some years.
Limenitis ursula, Fab.	July 21st.	Rare.
Satyrus alope, Fab.	" 16th.	Common.
Polyommatus phleas, Linn.	May 24th.	"
Goniloba tityrus, Sm. Abb.	" "	Rare; chrysalis not rare.
Hesperia bathyllus, Sm. Abb.	" "	Always abundant.

The locality referred to, in this paper, unless otherwise stated, is Schoharie, New York.

STATED MEETING, JUNE 13.

President BLAND in the Chair.

Ten Members present.

On ballot, Mr. George H. Hathaway of Chicago, Illinois, was elected a Corresponding Member of the Society.

On report of the respective Committees, the following papers were ordered to be published.

Descriptions of several new species of North American COLEOPTERA.

BY JAMES H. B. BLAND.

STAPHYLINUS CAPITATUS, n. sp.

Black; head fulvous; fifth and sixth dorsal and all the ventral segments, silvery-sericeous.

Hab.—Canada West. (Coll. Ent. Soc. Philadelphia.)

Body black, pubescent and having a few long black hairs scattered over the surface; head large, subquadrate, broader and larger than the thorax, fulvous, clothed with very short golden-sericeous pubescence, finely punctured, and having several deep, isolated, black punctures, from which proceeds a single long black hair; eyes small, rounded, black; mandibles long, acute, shining, fulvous, their tips black, as well as the palpi and the sides and undersurface of the collar; antennæ rufo-piceous, the basal joint fulvous, apical joints blackish. Thorax subquadrate, slightly narrowed behind, truncate anteriorly and rounded posterierly, finely punctured, densely clothed with very short black pubescence, and having scattered spots of fulvous pubescence, which are more obvious when viewed in certain lights; dorsal surface with a smooth, polished, longitudinal, elevated line, obsoletely defined in the middle; scutellum velvety-black. Elytra quadrate, broader than the head, the surface uneven, with dense short black pubescence; humerus with a lateral fulvous mark. Legs black, with black pubescence; the femora within stained with rufous. Abdomen narrower than the elytra, black, the 2nd, 3rd and 4th segments above with a velvety-black patch of pubescence on their middle, which have, when viewed in certain lights, a slight mixture of fulvous pubescence; 5th and 6th segments clothed with appressed silvery-sericeous pubescence; apical segments black, with an anal tuft of long black hairs; beneath, the thorax and ventral segments are silvery-sericeous. Length 6½ lines.

This species is readily distinguished from all others, by the fulvous head, and silvery band of the abdomen above. It was collected and presented to the Society, by Mr. William Saunders, of London, Canada West.

CHRYSOBOTHRIS PURPURATA, n. sp.

Purple, with three coppery depressions on each elytron.

Hab.—Nebraska. (Coll. Ent. Soc. Philadelphia.)

♀. Body purple. depressed; head very densely punctured, between the eyes a large rhomboidal impression, beneath which are two small smooth spots, and a little lower down the face is tinged with green; antennæ bronze, greenish towards the tip, 3rd joint a third longer than the 4th. Thorax nearly twice as wide as long, rounded on the sides; posterior margin lobed in the middle; dorsal groove not well defined. densely punctured, sides more densely and somewhat rugosely punctured, with a deep depression near the lateral margin; on each side of middle there is a transverse greenish spot. Elytra wider than the thorax, the sides straight to the posterior third, from which it narrows, somewhat obliquely, to the tip, and very finely serrate; tip rounded to the suture; purple, tinged with coppery towards the apex, densely punctured; on each elytron at base, a circular depression, the outline of which is obsolete behind towards the suture, in the middle of this depression there is a small lunular elevation; a little above the middle a rather large uneven coppery depression; just below the middle, near the lateral margin, a small transverse coppery depression, and a smaller one a little above the apical third, near the suture; subsutural costa entire from the apex forward to the anterior third, where it becomes obsolete and joins the lower margin of the semicircular basal depression; submarginal costa entire from the humerus almost to the tip: abdomen beneath bright coppery, polished, sparsely punctured. the sides more densely so; apical segment deeply emarginate in the middle. the sides scarcely serrated. Legs coppery, tarsi greenish. Length 4 lines.

♂. Smaller than the ♀, the face and antennæ entirely green; the sculpture of the elytra not so sharply defined, and the three coppery depressions not so bright; the last ventral segment is broadly emarginate at tip. Length 3 lines.

Collected and presented to the Society, by Mr. John Pearsall.

CARDIOPHORUS MONTANUS, n. sp.

Black, clothed with yellowish-sericeous pubescence.

Hab.—Rocky Mountains, Col. Ter. (Coll. Ent. Soc. Philad.)

Body black, minutely punctured, clothed, especially the elytra, with very fine, short, yellowish-sericeous pubescence, more obvious in certain lights; head rather strongly impressed between the eyes; mouth piceous, clothed with golden pubescence; antennæ about as long as the thorax, brown-black, serrate, basal joint robust. Thorax convex, sides rounded, very minutely punctured, shining, posterior margin depressed, on the middle of which there is a deep depression and another on each side of it; anterior margin with a shallow depression on each side of the middle; posterior angles subacute; scutellum impressed on the disk. Elytra as wide as the thorax; the dorsal surface flattened, with several shallow depressions; striæ tolerably well impressed and regularly punctured, interstices flat, indistinctly punctured, the 3rd to 6th striæ confused near the apex. Legs blackish-piceous, the tarsi rufous. Length 4¼ lines.

Closely allied to *C. convexulus* Lec., but is more robust and the face more deeply impressed. Presented to the Society by the Committee on Collecting Fund.

CORYMBITES BRUNNIPES, n. sp. = morulus Lec. Pr. a. Acad. 1866 p. 392.

Black, shining; elytra deeply striated; legs dark brown.

Hab.—Nebraska. (Coll. Ent. Soc. Philadelphia.)

Body elongate, black, shining; head and thorax with dense and rather strong punctures, those on the face coarser and confluent; the face broadly and deeply impressed, producing an obtuse tubercle on each side just above the insertion of the antennæ; mandibles piceous, with pale hairs; antennæ as long as the thorax in ♀, and longer in ♂, black, opaque, 3rd joint twice the length of the second, the 4th to the 9th joints about equal in length, the 4th and 8th being rather strongly serrate, apical joint somewhat constricted at tip. Thorax convex, sides rounded anteriorly, narrowed posteriorly; posterior angles rather long, divergent, carinated, the apex obtuse; disk with an obsoletely impressed line, more obvious in front; posterior margin deeply impressed; scutellum round, depressed, with a slight grey pubescence. Elytra about as wide as the thorax, depressed at base and slightly narrowed, widest at the posterior third and then gradually attenuated to the apex; striæ well impressed, very deeply so at base, rather indistinctly punctured, interstices convex, finely punctured; beneath black, polished, minutely punctuted, slightly pubescent. Legs dark brown, pubescent. Length ♂ 6 lines, ♀ 7 lines.

[illegible] with subsemicircular ridge near apex, apex truncate

The female is much more robust than the male, the elytra has a [illegible] slight cupreous tinge, while that of the male is slightly bluish. The [illegible] female specimen before me also differs from the male in the general [illegible] color being somewhat brownish, which is doubtless owing to immaturity. Collected and presented to the Society by Mr. John Pearsall.

[illegible]

CORYMBITES NIGRICOLLIS, n. sp.

Antennæ shorter and narrower joints [illegible] female, [illegible] -thorax [illegible]

Head and thorax black; elytra yellowish-brown, with four large dark marks.

Hab.—Rocky Mountains, Col. Ter. (Coll. Ent. Soc. Philad.)

Head black, closely punctured, flattened in front, clothed with golden pubescence; mandibles rufous, black at tip; palpi and antennæ piceous, the latter subserrate, the 2nd and 3rd joints slightly pubescent, remaining joints densely so, 2nd joint about half the length of the 3rd, 4th about equal to the 2nd and 3rd combined. Thorax black, much longer than broad; closely and neatly punctured, clothed with golden pubescence; somewhat narrowed in front; posterior angles slightly divergent, carinated; lateral margins nearly straight; deeply impressed on the middle of the posterior margin. Scutellum black, punctured. Elytra slightly dilated behind the middle; yellowish-brown, covered with short prostrate golden pubescence; striæ well impressed, distinctly punctured at base, obsoletely so at tip, interstices convex, somewhat rugosely punctured; a large dark brown mark on the anterior fourth extending from the 2nd sutural stria to near the lateral margin, thence inclining towards the humerus; a dark brown spot on the middle, commencing near the suture, widening towards the lateral margin, but not confluent with it; lateral margins reflexed; beneath black, minutely punctured, clothed with yellowish pubescence. Legs dark brown. Length 5½ lines.

Presented to the Society by Mr. E. T. Cresson.

PITYOBIUS BILLINGSII, n. sp.

Blackish-piceous; antennæ pale brown; legs and abdomen piceous.

Hab.—Canada West. (Coll. Ent. Soc. Philadelphia.)

♂. Body blackish-piceous; head coarsely and confluently punctured, deeply excavated between the eyes; mouth piceous; antennæ longer than the head and thorax, bipectinate, brown, becoming paler toward the tip, 3rd joint broader and larger than the 2nd. Thorax black, about equal in length and breadth, coarsely and confluently punctured, sides rounded in front, somewhat sinuate behind the middle, the posterior angles long, subacute, carinated and strongly divergent; dorsal groove deep, broader just behind the middle, on each side of this groove in front there is a large deep depression; posterior margin strongly and transversely depressed on each side. Elytra elongate, subconvex, slightly depressed at the anterior fourth, sides almost parallel, being slightly sinuate about the middle, gradually rounded at tip; striæ deep, not distinctly punctured, interstices convex, rugosely punctured; abdomen beneath piceous, finely punctured. Legs piceous, varied with rufous, tarsi pale rufous. Length 12½ lines.

This species differs from the ♂ specimen before me of *P. anguinus* Lec., by being much more robust, more coarsely punctured, the depressions of the thorax, though similarly situated, are much deeper and larger, the striæ of the elytra are more deeply impressed and the interstices more coarsely punctured. The greatest difference between these two species, however, lies in the proportions of the thorax, which in the present species, is as broad as long and the sides rounded in front, while in *anguinus* it is longer than broad and the sides nearly parallel. The color of the antennæ and legs is also different.

It gives me pleasure to dedicate this fine species to Mr. B. Billings, Jr., of Ottawa, Canada West, to whose kindness the Society is indebted for this and many other valuable Coleoptera.

GAUROTES CRESSONI, n. sp.

Black; elytra deep blue; abdomen rufous; femora, except base and apex, fulvous.

Hab.—Rocky Mountains, Col. Ter. (Coll. Ent. Soc. Philad.)

♂. Body black, shining; head closely punctured, with a longitudinal impressed line on the vertex; mouth piceous, with yellowish pubescence; antennæ about as long as the body, black. Thorax black, polished, feebly punctured, broader than long, narrowed in front and suddenly constricted to a band at both anterior and posterior margins; dorsal groove finely impressed, and on each side of it a shallow depression, outside of which, near the lateral margin, there is a much deeper depression; scutellum black, finely canaliculate, with a deep puncture near the tip. Elytra about twice as broad as the thorax, narrowed posteriorly; deep metallic blue, deeply and closely punctured, especially at base; humerus very prominent, there being a profound depression between it and the scutellum; body beneath black, abdomen rufous. Legs black, the femora, except base and apex, fulvous. Length 6 lines.

Distinguished from *G. cyanipennis* Say, and *G. abdominalis* Bland, by the much coarser punctation and by the color of the antennæ and legs; from *cyanipennis* it is at once distinguished by the short transverse thorax, the shape of which approaches that of *abdominalis*, but is still more transverse. It is, however, abundantly distinct from either species.

Presented to the Society by Mr. E. T. Cresson, to whom it is dedicated.

MELŒ AFER, n. sp.

Short, black; head and thorax coarsely and deeply punctured; elytra shining, rugosely punctured.

Hab.—Nebraska. (Coll. Ent. Soc. Philadelphia.)

Male.—Deep black. Head broader than the thorax, deeply, coarsely and somewhat confluently punctured; vertex with a longitudinal impressed line; antennæ as long as the head and thorax, the 4th to 10th joints moniliform, black, the 8th to apical joints pubescent. Thorax punctured like the head, quadrate, sides slightly sinuate behind the middle; disk with a deep longitudinal impression near the posterior margin which is depressed and sinuate. Elytra shining, rugosely punctured, the abdominal segments densely punctured. Legs black, faintly tinged with blue, sparsely punctured, shining; tarsal claws cleft. Length 4½ lines.

Resembles *M. parvus* Hald., but differs by being more coarsely and deeply punctured and somewhat shining. Collected and presented to the Society, by Mr. John Pearsall.

LYTTA TARSALIS, n. sp.

Black, clothed with yellowish-cinereous pubescence; femora and tibiæ, except their tips, fulvous.

Hab.—Illinois. (Coll. Ent. Soc. Philadelphia.)

Body dull black, finely punctured, clothed with yellowish-cinereous pubescence, which is longer on the head, thorax and base of elytra; head quadrate, broader than the thorax, suddenly constricted beneath the eyes, strongly tinged with purple; labrum shining, bilobate; palpi deep black; antennæ as long as the head and thorax in ♀, slightly longer in ♂, deep black, basal joint robust, rather long, 2nd joint small, 3rd more than twice the length of the 2nd, 4th and following joints moniliform, gradually larger towards the tip, apical joint robust and subconical. Thorax subquadrate, slightly tinged with purple, the anterior third gradually narrowed in front, sides of the posterior two-thirds straight; disk with a slight longitudinal impression. Elytra elongate, parallel, dull black, clothed with short prostrate yellowish-cinereous pubescence, longer at the base; tips regularly rounded from the suture to the lateral margin. Legs black, the femora and tibiæ, except extreme tips, fulvous; coxæ densely clothed with long yellowish pubescence; tarsal claws cleft. Length ♂ 5½ lines, ♀ 7½ lines.

Collected and presented to the Society by Benj. D. Walsh, Esq., of Rock Island, Illinois.

CHRYSOMELA PALLIDA, n. sp.

Pale yellow; head and body beneath rufous; elytra with several longitudinal black spots.

Hab.—Rocky Mountains, Col. Ter. (Coll. Ent. Soc. Philad.)

Body pale yellow, convex, shining, feebly punctured; head rufous, orbits of the eyes and the clypeus strongly punctured; tips of the mandibles black; antennæ pale rufous, the four apical joints blackish. Thorax with the posterior two-thirds ferruginous, the anterior margin of the ferruginous portion undulate and not reaching the lateral margin of the thorax; on the middle of this mark there are two rounded yellowish spots; scutellum black, polished. Elytra with 8 black marks, arranged in series, thus—2, 3, 1, 2,—the first series consists of a spot on the humerus and a hooked-shaped mark within and a little lower down, the second series consists of three unequal longitudinal lines, each placed lower than the other towards the suture, then comes a single, slightly oblique, longitudinal line, interrupted, so as to form a semicolon, on the left elytron, and near the apex there are two dots, the outer one higher up; in some specimens, these two spots, most probably, become confluent and form a line; all these spots are surrounded by a line of distinct punctures; there are also two regular rows of punctures near the suture and two others near the lateral margin, otherwise the punctures are scattered and feeble; sutural and lateral margins narrowly pale rufous. Legs and undersurface of the body rufous, the former paler. Length 3 lines.

This species belongs to Group A of Rogers' Synopsis of this genus in Proc. Acad. Nat. Sci. Philad., VIII, p. 32.

Presented to the Society by the Committee on Collecting Fund.

COCCINELLA ÆTHIOPS, n. sp.

Deep black, smooth and polished.

Hab.—Rocky Mountains, Col. Ter. (Coll. Ent. Soc. Philad.)

Body entirely deep black, very convex, smooth and polished; apical margin of the clypeus whitish; tarsi beneath clothed with whitish pubescence; lateral margins of the elytra distinctly but narrowly reflexed; beneath minutely punctured, shining. Length 2 lines.

Presented to the Society by the Committee on Collecting Fund.

Descriptions of North American LEPIDOPTERA. No. 3.

BY AUG. R. GROTE,

Curator of Entomology, Buffalo Society Natural Sciences.

EPIALOIDEA, H-S.

Gorgopis quadriguttatus, nov. sp. Plate 1, fig. 6, ♀.

Anterior wings pale greyish, very faintly tinged with pale salmon color, the latter shade more prominent along internal margin, with broad, pale olivaceous-brown bands: the first very oblique, joining the internal margin about two-thirds from the base and approximate to the terminal band, not extending above the median vein, and enclosing, between the forks of the submedian vein, two nearly equal sized silvery white spots ringed with black; midway between the base of this band and the base of the wing is a similarly colored patch on the internal margin; two similarly colored patches on the costa, and beyond them a second, broad, inversely oblique, irregular band extending from the costa to vein 3, faintly tinged with ochraceous inferiorily. A broad sub-apical demi-band; terminal band very wide, narrowest at apex, similarly colored to the other bands, paler towards internal angle. Posterior wings entirely pale salmon color, greyish on the costa, showing a brownish sub-apical patch. Abdomen pale salmon-color; thorax, head and antennæ olivaceous, metathorax clothed with long salmon-colored hairs. Under surface of both wings tinged with salmon-color, reflecting the markings of upper surface on anterior wings. ♀ Exp. $3\frac{5}{8}$ inches.

Hab. "Great Slave Lake." Mr. Ross.

Allied to *Gorgopis argenteo-maculatus* Harris; the disposition of the median bands on the anterior wings is somewhat different and they are not so largely tinged with ochraceous, the two white spots are much smaller and the apex apparently not so falcate, while the coloration of abdomen, metathorax and posterior wings, readily distinguishes the present from Harris' species.

A small collection of unset Arctic Lepidoptera, which included the preceding species, collected principally by Mr. Robert Kennicott, was kindly submitted to me by Mr. Wm. H. Edwards, and contained, among others, the following species:—

Macroglossa thysbe, Fabr.

"Athabasca River, July." R. Kennicott.

Clisiocampa americana, Harris.

"Athabasca River, July." R. Kennicott.

A single ♀ specimen varying in coloration from ordinary individuals of the species.

Lithosia bicolor, Grote.

The entire insect is dark lead color except a yellow costal stripe, which extends from apex to apex of anterior wings crossing the collar, ♀. Exp. ¾ inch.

"Athabasca River, July." R. Kennicott.

A single specimen in indifferent preservation.

Arctia parthenos, Harris.

Arctia borealis, Möschler.
Arctia americana, Walker, non Harris.

"Great Slave Lake." Mr. Ross.

Two (♂ ♀) specimens, varying in the number and size of the yellowish spots on anterior wings.

It seems probable that while Mr. Walker has described the present species as *A. americana*, Harris, he has also regarded the latter species as identical with the European *A. caja*, Linn, from which it is readily distinguished by the white band on the collar, scarlet palpal fringe, etc. Mr. Möschler's *Arctia borealis* is evidently a synonym of this species, while his *Arctia caja*, W. E. M. 4, p. 360, is doubtless = *A. americana*, Harris.

Pygæra inclusa, Hübner.

"Mackenzie River to Lake Athabasca." R. Kennicott.

Noctua augur, Fab.

"Athabasca River, July." R. Kennicott.

Four ♂ specimens.

Scoliopteryx libatrix, Linn.

"Youkon River, mouth of Porcupine River." R. Kennicott.

Anarta brephoides, Walker.

"Youkon River, mouth of Porcupine River." R. Kennicott.

A single ♂ individual, wanting antennæ. A very interesting species, differing greatly from its congeners and having much the appearance of an aberrant Brephide. The head and prothorax are thickly clothed with rigid hairs, which conceal the "face." I regard this species as belonging to an undescribed genus, which I can merely indicate with such insufficient material.

Botys octomaculata, Linn.

"Mackenzie River to Lake Athabasca." R. Kennicott.

Metrocampa perlata, Guenée.

"Athabasca River, July." R. Kennicott.

Two (♂ ♀) specimens.

Cidaria diversilineata, Hübner.

"Youkon River, mouth of Porcupine River." R. Kennicott.

A single, much denuded individual, apparently referable to this species.

Cidaria obducata. Möschler.?

"Mackenzie River to Lake Athabasca." R. Kennicott.

A slightly denuded specimen, differing from Mr. Möschler's figure and description sufficiently to give me doubt as to the correctness of this determination.

Cidaria hastata, Linn.

"Mackenzie River to Lake Athabasca." R. Kennicott.

A single specimen.

ARCTIOIDEA, H-S.

Arctia Saundersii, Grote.

A. virguncula, Saunders, Syn. Can. Arct. p. 9.

Anterior wings deep velvety black, all the veins narrowly marked with flesh-color. A moderately broad flesh-colored band traverses the length of the wing from base to external margin, becoming furcate above internal angle, and upon which, in the terminal half of the wing, rests a series of similarly colored bands resembling the letter K, with the straight stroke turned towards the base of the wing and the upper limb, attaining external margin, reflexed to costa near the apex; a transverse demi-band crosses the disc from the sub-costal to median veins.

Costa, internal margin and fringes, flesh-color. Posterior wings pinkish-red with a pale buff shade along costal margin; a series of black spots occupying the terminal space, becoming confluent at external angle, a single black sub-costal spot beyond this series of terminal spots. Under surface of wings paler, yellowish along all the margins, reflecting indistinctly the markings of the upper surface. Tegulæ and disc black bordered with flesh color, collar with two black spots; head flesh color, immaculate above; antennæ, palpi, legs and under surface of abdomen smoky-black, anterior femora touched with yellowish inferiorily; abdomen pale yellowish pink above with a dorsal row of reduced black marks. ♂ Exp. 1½ inches.

Hab. Canada West. (Coll. Ent. Soc. Philad.) Common.

Larva. "Head small, black, reddish at the sides. Body dull-black, rather glossy, with a slight reddish tinge. On each segment is a transverse row of black tubercles, emitting tufts of stiff bristly hairs of the same hue. Hairs on the two broader segments longer than those on the others. A faint whitish dorsal line from the head to the third segment. Under surface dull-red, feet and prolegs of the same color.." Saunders.

The imago of the present species closely resembles *A. virgo* Linn.. in coloration, and is distinguishable from that species by its smaller size, the stripes on the veins on anterior wings being confined to the vein, linear, not spreading out on either side, and by the absence of central and discal spots on the posterior wings. The larva has also been ascertained by Mr. Saunders to be distinct, as will be seen by his description which I have quoted above.

It affords me much pleasure to dedicate this species to Mr. Wm. Saunders, who first suggested its distinctiveness from *A. virgo* Linn., while erroneously regarding it as Kirby's *A. virguncula*.

From the absence of comparative allusion it would appear that Kirby in describing his *Callimorpha parthenice*, was unaware of the existence of the description of Linnæus' *virgo*, and whether or no there be two large distinct forms included under the latter name, which I much doubt, I am of opinion that *parthenice* Kirby, should be regarded as a simple synonym of *virgo* Linn. Kirby's description presents some resemblance to *A. Saundersii*, but the (♂) expanse given (1¾ in.) is larger. *A. parthenice* Saunders, appears to me a modification of *A. virgo* Linn.. with brown antennæ and apparently broader stripes, but I should hesitate to assume a specific distinctiveness upon such small differences. the expanse being the same. I believe then to assume but two distinct species, the one *A. virgo* Linn., larger, the stripes on the median vein extending on either side beyond the vein itself, the other *A. Saundersii* m., smaller, the stripes on the median vein linear, confined to the vein itself.

Arctia Persephone, Grote. Plate 1, fig. 3, ♂.
A. Persephone, Grote, Proc. Ent. Soc. Phil., Vol. 2, p. 433.

The figure is taken from the typical specimen in the Collection of this Society. I have seen a second, perfectly corresponding but smaller individual, in the collection of Jas. Ridings, Esq., Philadelphia.

Arctia decorata, Saunders. Plate 1, fig. 4, ♀.
A. decorata, Saunders, Proc. Ent. Soc. Philad., Vol. 2, p. 60.
A. decorata, Saunders, Syn. Can. Arct. p. 11.

Hab. Canada, Eastern and Middle States. (Coll. Ent. Soc. Phila.)

Mr. A. S. Packard Jr. informs me that he considers this species as *Spilosoma nais* Drury, which has however, according to figure and description, yellow posterior wings and abdomen. It evidently belongs to a different, and as yet undescribed genus from those to which it has hitherto been referred. *A. nais* Saunders, as I have ascertained from an examination of the author's specimens, is=*virguncula* Kirby. I refer to Mr. Saunders' paper for further particulars regarding this species.

LIPARIDINA, H-S.

LACOSOMA, nov. gen.

♂. Anterior wings ample, straight along the costa, broadly subfalcate, exterior margin rounded, slightly excavated between the 2nd and 3rd inferior veins, internal margin straight; posterior wings ample, entire, rounded along external margin, anal angle prominent and very slightly projected, internal margin folded, sparsely fringed with long hair. Head small, sunken; front broad; eyes small; antennæ moderately short, deeply bi-pectinate, pectinations decreasing towards the tips, with a basal tuft. Legs moderately slight, sparsely clothed with long coarse hair; anterior tarsi naked; posterior tibiæ with two small terminal spurs; anterior and middle tibiæ, unarmed. Neck, below the head, well clothed with long hair; palpal structure rudimentary; abdomen cylindrical, compact, evenly clothed with short hair, not crested, anal valves moderately clothed with coarse hair. ♀, not seen; pterogostic structure not examined.

I erect this genus for a hitherto undescribed species of N. A. Lepidoptera, a description of which follows, and which appears to me isolated from any heretofore described genera of the Order. The antennal structure resembles *Orgyia:* the shape of the wings recalls in miniature that of certain Saturniina.

Lacosoma chiridota, nov. sp. Plate 2, fig. 8, ♂.

Anterior wings dark yellowish brown, with two undulating blackish median bands, the outer of which, the broadest and most distinct; discal spot rounded, black; terminal space with a blackish shade stretching over the apex. Posterior wings dark yellowish brown crossed by two arcuated darker bands which appear as the continuation of the bands on the anterior wings; fringes very short, whitish. Base of both pair and internal margin of posterior wings together with thorax and abdomen of a dull greenish tinge, latter darker shaded underneath. Under surface of wings of a lighter shade than upper surface and showing a single distinct blackish band running across both wings; discal spot large on anterior, small on posterior wings, the former show a blackish apical shade. Legs pale yellowish, head paler than thorax, eyes black. ♂, Exp. $1\frac{1}{10}$ inch.

Hab. Pennsylvania. (Coll. Ent. Soc. Philad.)

The coloration of this species recalls that of certain Hesperidina.

NOCTUINA, H-S.

Microcœlia diphtheroides, Guenée. Plate 2, fig. 2, ♀.
M. diphteroides, Guenée, Noct. 1 p. 34. Plate 3, fig. 7.
M. diphteroides, Walker, C. B. M. Noct. p. 31.

Anterior wings dull-green; ordinary lines black, distinct. Basal line composed of two black lines enclosing a central white line; transverse anterior line similarly composed, very sinuate, bordering externally a large square black costal spot, which latter occupies the entire sub-basal space, between the basal and transverse anterior lines, at the costa. Median space large; ordinary spots large, sufficiently distinct: reniform, of the same green as the ground of the wing, ringed with black, soiled inferiorily by the brownish median shade line, which latter is strongly marked at the costa and, emerging from two black costal marks, forms an oblique streak between the ordinary spots, then, becoming discontinued, reappears below the reniform spot traversing the wing to internal margin; orbicular spot incomplete; the discal space, between the ordinary spots, is partly occupied by a squarish black spot, connecting the ordinary spots below their center; claviform, large, indicated by an arcuated black line. Transverse posterior line emanating from a broad black costal spot, geminate, projected at costa, lunulated, white in the center of the lunules, followed by a double row of black and white dots; two black costal dots alternated with white. Subterminal line black, bordered externally with white and composed of broad sagittate marks of which four are most broadly expressed, becoming linear towards internal margin; a terminal row of black spots between the veins; fringes blackish, narrowly interrupted with white at the extremities of the veins. Posterior wings whitish-grey, with a very faint discal spot, two faint dentated subterminal bands, and an interrupted black terminal line; the terminal space has a very faint greenish reflection. Under surface of both wings strongly tinged with reddish; posterior wings showing a distinct black discal spot and two faint bands. Legs, under surface of abdomen, tinged with reddish; thorax dull green, with a black band in front, a narrow transverse black line at the base of the tegulæ and an interrupted line at extreme base; tegulæ narrowly bordered with black. Exp. $1\frac{4}{10}$ inches.

Hab. Middle and Eastern States. (Coll. Ent. Soc. Philad.)

A single specimen in excellent preservation. It would be difficult to identify this species with certainty from M. Guenée's figure of it, which equally resembles the following:—

Microcœlia obliterata, nov. sp.

M. diphteroides, Walker.

"*Var. β.* Alæ anticæ lineis guttisque obsoletis," Walker, C. B. M. Noct. p. 31.

Anterior wings whitish olivaceous green, darker in the subterminal and terminal spaces. All the lines are indicated, pale and olivaceous; ordinary spots faintly marked, bordered with black; the first large sub-basal costal spot is much reduced; the black spot between the ordinary spots occupies the same position and is as distinct as in the preceding species. Under surface of both wings of a much paler shade of reddish than in *M. diphtheroides.* ♂ and ♀ similar. Exp. $1\frac{5}{10}$ inch.

Hab. Eastern and Middle States. (Coll. Ent. Soc. Philad.)

Microcœlia fragilis, Guenée.

M. fragilis, Guen., Noct. 1, p. 34.
M. fragilis, Walk., C. B. M. Noct. p. 31.

Wings broad; anterior pair whitish, sprinkled with black and with the ordinary marks black, distinct, powdery. The basal space is occupied, below the submedian vein, by a blackish shade which forms an ill-defined black streak superiorily; the transverse posterior line is slightly oblique, geminate. formed of two rather widely separated undulate black lines. The ordinary spots are well defined. encircled with black, with white centers, of the normal shape; the median shade line is black, appearing above and below the reniform spot and joining a diffuse black streak which occupies the position of the claviform spot. The transverse posterior line is white, much lunulated, projected superiorily, and bordered posteriorily by a distinct black coincident shade. The subterminal and terminal spaces are narrow owing to the large median space; subterminal line much interrupted; a terminal row of small black lunate spots between the veins; fringes whitish, minutely interrupted with black between the veins. Posterior wings silky, whitish, immaculate, with a terminal interrupted blackish line; fringes white, interruptions obsolete. Under surface of the wings with a pale yellowish shade: anterior pair with faint subterminal bands: posterior pair with a black discal dot and faint median irregular undulating line. Head whitish with two parallel black lines between the eyes; base of antennæ whitish on the inner side; thorax whitish, blackish on the collar and sides of tegulæ, with some posterior blackish marks; palpi white, second joint black; abdomen greyish. ♂. Exp. $1\frac{3}{10}$ inch.

Hab. Canada, Eastern and Middle States. Coll. Saunders.

Closely resembles *M. diphtheroides* Guen., in all but coloration.

I assume that *M. obliterata* will receive additional evidence of its distinctness from *M. diphtheroides* Guen., on the discovery of the larval states, and I have for the present refused to regard it as a variety of that species; its presence in numerous collections in which the latter is wanting would favor the view of its validity. It appears to sustain a parallel relation to *M. diphtheroides* that *Lacinia expultrix* m., does to *L. cymatophoroides* Guen., and in the latter case I have noted larval differences which will not permit the species to be united. (*Proc. Ent. Soc. Phila.* Vol. 2, p. 134.)

Dr. Herrich-Schæffer, Korr. Blatt. d. zool. min. Ver. in Regensburg, 1858, p. 153, would refer *Microcœlia diphtheroides* to Hübner's genus *Moma*, I think incorrectly, the habitus of the species being very different from that of the European *Moma orion* Linn., to which latter species *D. fallax*, H-S. and *D. græfii*, m., are more nearly allied. Subsequently, Korr. Blatt. d. zool. min. Ver. 1860, pp. 71 and 72, the same distinguished authority, recognizing the validity of M. Guenée's genus *Grammophora*, would unite under the latter generic name the species included under *Microcœlia* Guen., regarding the two genera as identical although placed by M. Guenée in different families. I incline to believe this view correct, while I am as yet prevented, through paucity of material, from making the necessary examinations to establish the fact. *M. vinnula*, m., appears to me the link connecting the two series of species, for, while showing the ornamentation of *Microcœlia*, it has much the habitus of *Grammophora hebræa* Guen.

Gortyna cataphracta, nov. sp. Plate 2, fig. 3, ♂.

Anterior wings purplish brown, basal and median spaces pale yellowish, ordinary spots distinct, yellow, median lines geminate, dark brownish. Basal line distinct; sub-basal space dark purplish brown; transverse anterior line sinuate; median space large, pale yellowish, sprinkled with purplish atoms; orbicular spot rounded, distinct, yellow, with a central brownish dot; claviform, rounded, large, distinct, divided in the centre by a very faint brownish line. Reniform spot large, yellow, with a central brownish line, sub-divided externally by brownish lines into several smaller sub-spots. Transverse posterior line acutely projected below the costa, oblique; terminal and subterminal spaces purplish brown very sparsely sprinkled with yellowish atoms; subterminal line obsolete, emerging from a large, pale, irregular, yellowish apical spot. Posterior wings cinereous, immaculate. Under surface of both wings cinereous with darker subterminal bands. Thorax and abdomen cinereous, former slightly sprinkled with a paler shade. ♂ ♂. Exp. 1½ in.

Hab. Eastern and Middle States. Coll. Ent. Soc. Philadelphia.

A delicate species with the habitus of *G. nebris* Guenée. It differs from the other North American species of the genus in that the ordinary spots are of the same color as the median space, and not separated into raised whitish dots, excepting only *G. nitela* Guenée, in which the ordinary spots may be regarded as obsolete.

Apamea legitima, nov. sp. Plate 2, fig. 4, ♂.

Anterior wings carneous grey; median lines very approximate, black; ordinary spots large. Basal line black, lunate, geminate; sub-basal space large, brownish carneous at costa, greyish at internal margin and along the transverse anterior line. Transverse anterior line blackish-brown, narrow, irregular undulate. Orbicular spot greyish, diffuse, ringed with brownish-black. Claviform very distinct, of the usual shape, brownish-black; reniform, large, carneous brownish, surmounted by a black and greyish costal mark from which the transverse posterior line emanates, becoming much projected superiorily and obsolete, reappearing below the reniform spot. Subterminal space carneous grey, large, brownish at the costa, showing three slightly yellowish costal dots. Subterminal line brownish, distinct, becoming sub-obsolete at costa; apex greyish, terminal space brownish, terminal line narrow, distinct. Posterior wings silky, pale cinereous with blackish borders. Thorax, tegulæ and collar pale brownish, latter edged with black; abdomen cinereous tinged with reddish-brown beneath, on the sides and on the anal segment. ♂ and ♀, similar. Exp. $1\frac{4}{10}$ to 1½ inches.

Hab. Middle and Eastern States. Common.

Eurois purpurissata, nov. sp. Plate 1, fig. 5. ♂.

Anterior wings broad, rounded, pale purplish greyish, tinged with blackish along the costa and reddish on the discal space; median lines geminate, transverse posterior indistinct inferiorily, subterminal very distinct, continued, reddish-brown. Basal line geminate, dentate, distinct; transverse anterior straight, geminate, undulate; orbicular spot moderate, rounded, with a faint central streak; claviform spot small, distinct, edged with reddish brown; median shade line distinct, blackish, contiguous to the reniform spot, which latter is large, elongated, slightly constricted, with a central annulated line, the contiguous discal space shaded with reddish; transverse posterior line projected superiorily, approximate to the transverse anterior line at internal margin, regularly lunulated between the veins, geminate, indistinct in the inferior half of the wing. Veins marked with a darker shade in the subterminal space and showing a series of pale faint dots contiguous to the transverse posterior line. Subterminal line distinct, reddish-brown, dentate, the Σ more distinct than in any of the allied species; terminal lunules black, narrow; fringes brownish, narrowly interrupted with greyish at the extremities of the veins. Posterior wings brownish, silky, without median line or discal lunule, with a darker shaded diffuse terminal band, fringes white at the extremities. Under surface brownish, silky, with two faint, subterminal, darker bands crossing both wings; posterior wings paler, with discal dot. Collar with a distinct dark brown median line, upper edge whitish; thorax with a large central crest, dark cinereous with a purplish tinge; abdomen with paler hairs at the base, brownish, very slightly crested; legs brown, tarsi paler at base; head pale brownish, with a darker transverse line between the eyes; palpi brown, tongue pale brownish. ♂ ♂. Exp. $1\frac{9}{10}$ to $2\frac{2}{10}$ inches.

Hab. Pennsylvania. Coll. Ent. Soc. Philadelphia.

Two ♂ specimens varying in size and distinctness of ornamentation. In size this species approaches *E. nimbosa* Guen., and *E. imbrifera* Guen., and in coloration somewhat resembles the European *E. tincta* V.; it is however a more robust species than any of these and sufficiently distinct from all its generic allies. With Mr. Walker I retain for the present genus the name under which Hübner arranged the species in his "Verzeichniss," in preference to *Aplecta* Guen., as Hübner's Eurois perfectly corresponds to M. Guenée's genus and has decidedly priority. I have another undescribed species of Eurois, allied to *E. nimbosa* and *E. nebulosa*, from the Rocky Mountains, but I cannot make a proper description from a single individual in indifferent preservation.

Plusia æreoides, nov. sp. Plate 2, fig. 5. ♀.

Anterior wings pale rose color, shaded with dark yellowish, median lines straight, darker shaded. Basal line straight, succeeded by a straight sub-basal line and dark yellowish shade. Transverse anterior line straight; median space large, roseate, with a posterior dark yellowish shade which is broadest at internal margin. Reniform spot distinct, elongated, constricted; median shade yellowish, visible at costa. A similar spot to the reniform and approximately occupying the position of claviform, is visible below the median vein, near the transverse anterior line; orbicular spot obsolete. Transverse posterior line straight, sometimes very slightly bent, dark yellowish, distinct, followed by a metallic band which is broadest at the internal margin and becomes diffuse and discontinued just before the costa. Subterminal line dark yellowish, distinct, undulate, bi-toothed between the first and second inferior veins, terminal space faintly metallic with a distinct, narrow, terminal pale rose-colored band. Posterior wings silky, blackish; fringes pale ochraceous. Under surface of anterior wings pale ochraceous, with two transverse blackish bands and discal spot absorbed in the blackish color of the disc. Under surface of posterior wings pale ochraceous with two blackish bands, outer one diffuse, and a discal lunule. Thorax honey yellow, carneous posteriorily and on the tegulæ; abdomen with three slightly ferruginous crests. ♂ and ♀. Exp. 1¼ inches. Coll. Ent. Soc. Philadelphia.

Not uncommon throughout the Middle and Eastern States.

Closely allied to *P. ærea* Hübner, from which it constantly differs by its somewhat larger expanse, the larger median space, the straight distinct median lines, the transverse posterior line succeeded by a metallic band and by the presence of a second discal spot on the anterior wings. Many ♂ ♀ individuals from Mass., N. Y., Penn., which I have before me are constant in these and other more trifling differences from *P. ærea*. I believe to cite here M. Guenées " A," which that Entomologist refers as a variety to *P. ærea* on account of an intermediate individual which he has seen from Florida. Nevertheless I believe with a sufficient number of perfectly coinciding specimens of both species to correctly separate the present under a distinct specific name.

LITOMITUS, nov. gen.

Wings broad; anterior pair with the apex acute, external margin rounded, 12-veined, median vein throwing off veins 2, 3, 4, 5 (m.), which are equally strong, 3, 4 and 5 equi-distant at base, costal margin broad, sub-costal cell narrow, receiving vein 6 at the center of its lower marginal vein. Posterior wings broad, 9-veined, veins 1 and 2 (m.) free to base, median vein throwing off veins 3, 4, 5 and 6 (m.) equally strong, the three latter approaching at base, vein 5 nearer 4 than 6 at base, veins 9 and 8 (costal and subcostal) diverging at extreme base of the wing. Palpi clothed with short hair, long, porrect, exceeding the head, 3rd article distinct, long, moderately stout, not spatulate; head small; eyes large; antennæ moderately short. slender, very slightly pubescent in ♀, longer and slightly stouter in ♂; abdomen smooth, slender, hardly exceeding the posterior wings, furnished with a subtuft in the ♂, shorter, more conical, obtuse, and with two lateral subtufts in the ♀; legs smoothly clothed with short hair, hind tibiæ with four spurs, inner pair the longest, hind femora furnished with a central very slender spine; tongue moderate, well developed.

I refer this genus to M. Guenée's Poaphilidæ, the single species composing it having evident analogies with *Phurys* and *Celiptera.* The differences it presents from the latter are small; the abdomen is not "crested" in either sex on the first segment nor are the legs clothed with "cottony" hairs. Mr. Walker, to whom I communicated a specimen, regarded genus and species as new, while doubtfully considering them as allied to *Toxicampa.*

Litomitus elongatus, nov. sp. Plate 2, fig. 6. ♂.

Anterior wings of an even dull testaceous ash-color. Basal half-line narrow, emanating from a very distinct brownish black costal spot; transverse anterior line distinct, brownish black, broadest at costa, followed by a darker shade and forming, below vein 1 at internal margin, a broad arcuated spot somewhat similarly shaped to the sub-cellular sign of the genus *Plusia*, but inverted. Orbicular spot reduced to a very minute white dot; median shade line narrow, most distinct at costa, irregularly undulate, traversing the wing from costal to internal margins between the ordinary spots; reniform spot distinct, large, rounded, ringed with a brownish line, with an internal lighter shade, concolorous with the rest of the wing, connected superiorily with the costa by a narrow shade line and succeeded by an irregulary dentate, distinct shade line somewhat projected superiorily and which occupies the position of the transverse posterior line. A very distinct, nearly straight, ochraceous, geminate band, preceded by a lighter shade, traverses the wing from costal to internal margins, emanating just before the apex, and joining the internal margin just before the internal angle, the outer line shaded with brownish black. The subterminal line is very approximate to this band, faint, regularly dentate, connecting a series of small distinct black dots on the veins. Terminal line narrow, distinct, semi-lunate, continued; fringes concolorous. Posterior wings of a lighter more testaceous shade than anterior, anal angle showing a blackish, straight, discontinued shade line followed by a narrow irregular line which is also discontinued after traversing about one-fourth of the entire breadth of the wing. Under surface of both pair somewhat lighter shaded, without markings except a faint median shade line on the anterior wings. Head, palpi, thorax, abdomen and legs dull cinereous, same shade as posterior wings, without markings. ♂ and ♀, similar. Exp. $1\frac{4}{10}$ to $1\frac{6}{10}$ inches. Coll. Ent. Soc. Philadelphia.

Hab. Eastern and Middle States. Not uncommon.

Amphipyra inornata, nov. sp.

Anterior wings silky, pale-blackish mixed with greyish, resembling in ornamentation those of *A. pyramidoides* Guenée. In the present species the orbicular spot appears more reduced, the transverse posterior line more bent, and the costa more convex. Posterior wings cupreous, blackish-grey along the costa to 3rd superior vein, rest of the wing with a faint, pale reddish tinge, ill-defined superiorily along external margin, which latter is more excavated than in *A. pyramidoides*, in which the posterior wings appear proportionally larger. Thorax greyish mixed with dark brownish; tegulæ and disc paler than in *A. pyramidoides.* Abdomen pale greyish above, marked with black and white at the sides as in its congener, but with a more testaceous anal tuft. ♂. Exp. 1½ inches. Coll. Mr. Wm. Saunders.

Hab. Canada West.

In the markings of the anterior wings this species nearly imitates *A. pyramidoides*, the costa is however perceptibly more convex, the coloration paler and the designs more effaced. The coloration of the posterior wings is quite different and they appear at first glance almost concolorous; these differences, together with its smaller size, prevent me from considering it as a variety of *A. pyramidoides*, which latter is moreover a very constant species.

Catocala phalanga, nov. sp. Plate 3, fig. 1. ♂.

Var. "A." *C. palæogama* Guenée, Noct. 3, p. 97.

Anterior wings slightly produced at the apex, blackish, suffused with pale bluish grey on the superior half of the median space, transverse posterior line followed by a distinct black coincident band. Extreme base greyish; basal line black, distinct; sub-basal space large, entirely suffused with black. Transverse anterior line irregularly undulate, black, distinct, forming a sub-costal tooth; median space pale bluish grey, almost whitish anterior to the reniform spot, sprinkled with dark brownish along internal margin; reniform spot moderate, oval, bordered with whitish, sub-reniform spot small, rounded, ringed with a dark brown line, with a pale brown center, unconnected with either of the median lines. Transverse posterior line black, distinct, moderately dentate, with two moderately prominent nearly equal sized teeth, broadly marked at its last and deepest inflexion at internal margin, followed by a distinct, coincident black band which occupies the narrow space between it and the sub-terminal line, which latter is faintly marked and preceded by a broad continued distinct whitish shade band. Terminal space with a series of black and greyish spots between the veins. Posterior wings dark yellow, dark brown at base, internal margin clothed with long dark brown hair. Median band black, absorbed superiorily by the brown basal shade, much constricted at the disc, tapering, sinuate to internal margin. Terminal band broad, black, leaving a yellow space at external angle and a narrow line from thence to anal angle, streaked five times with blackish at the center of the external margin. Under surface dark orange yellow, transverse bands black with a slight purplish shade, median band on posterior wings much attenuated, becoming obsolete towards internal margin. Abdomen dull brownish above, whitish below; legs pale greyish, posterior tibiæ white inside, tarsi white at base. Exp. 3 inches. Coll. Ent. Soc. Philadelphia.

Hab. Middle States.

Possibly a variety of *C. palæogama* Guenée, but, as several coincident specimens have occurred, it may be distinct. Mr. Edwards informs me that he has in his possession an individual belonging to the present species obtained from Mr. Newman of Philadelphia.

Catocala palæogama, Guenée. Plate 3, fig. 2. ♂.
C. palæogama, Guenée. Noct. 3, p. 97.

Anterior wings slightly produced at the apex, blackish, powdered with bluish-grey, median lines black, distinct, transverse posterior, followed by a broad brown shade band. Basal line black, distinct, undulate; sub-basal space powdered with bluish-grey; transverse anterior line black, distinct, irregularly undulate, with a sub-costal tooth, preceded by a darker diffuse shade. Median space evenly powdered with bluish-grey, sometimes (♀) whitish anterior to the reniform spot. Reniform spot moderate, oval, dark brown with a darker ringlet; subreniform spot moderate, somewhat squarish with a pale brown center, ringed with black. Transverse posterior line evenly dentate, with two broadly prominent teeth, broadly marked at its last and deepest inflexion at internal margin, followed by an even, broad, brown shade, which occupies the space between it and the sub-terminal line, latter distinct, black, preceded, towards internal margin, by a greyish shade. Terminal space with a row of black and greyish dots between the veins. Posterior wings yellow with a basal dark brown shade, internal margin clothed with long dark brown hair. Median band black, absorbed superiorily by the brown basal shade, much constricted at the disc, tapering, sinuate to internal margin. Terminal band broad, black, leaving a small yellow space at external angle and a narrow yellow line from thence to anal angle, streaked five times with blackish at the center of external margin. Under surface dark orange yellow, median bands black, slightly purplish, median band of posterior wings attenuated, obsolete towards internal margin. Exp. 3 inches. Coll. Ent. Soc. Phila.

Hab. Canada; Eastern and Middle States.

I can detect no differences between *C. phalanga*, m., and the present species, with which it conforms in the shape of the wings, size, course of the median lines on the anterior, and coloration of posterior, wings, except the distinct black band which follows the transverse posterior line, giving an appearance of narrowness to the sub-terminal space, and the paler coloration of the median space superiorily.

The following species is regarded by some Entomologists as identical with the foregoing, but I am of opinion that it is very distinct. I think it probable, from determinations I have received from Mr. Walker, that *C. palæogama*, of the British Museum, refers to the present, and not to the species I have above described as *C. palæogama* Guenée.

Catocala piatrix, nov. sp. Plate 3, fig. 5. ♂.

Anterior wings brown, varied with blackish, with a paler oblique costal band extending over the sub-reniform spot. Transverse anterior line black, distinct, irregularly undulate with a sub-costal tooth; median space brown with a broad, oblique, anterior, paler costal shade band which extends over the sub-reniform spot (♂). Reniform spot very large, rounded, ringed with an indistinct brownish line, smaller, more distinct in the ♀; sub-reniform spot long, pale brownish, oblong, enclosed by (♂) the transverse posterior line; transverse posterior line distinct, uniformly black and of equal width, with two nearly equal sized, moderately prominent and acute teeth, sometimes (♀) followed by a brown band; subterminal line geminate, indistinct, with an anterior greyish band in the ♀. Posterior wings yellow, of a paler shade than in *C. palæogama*, and *C. phalanga;* median band broad, hardly constricted on the disc, slightly tapering to internal margin. Base of the wing very pale brownish yellow; internal margin clothed with pale brownish yellow hair, internal fringe cinereous, terminal band broad. black, leaving a yellow space at external angle, distinctly terminating before anal angle. Under surface pale luteous, pale ochraceous brownish along external margins, orange-colored at base of posterior wings, median bands black, slightly iridescent; legs brownish. Exp. $2\frac{7}{10}$ to 3 inches. Coll. Ent. Soc. Philadelphia.

Hab. Middle and Eastern States. Common.

Differs from *C. palæogama* Guenée, by the more acutely toothed transverse posterior line on the anterior wings, which connects with the subreniform spot, by the larger ordinary spots and the absence of the bluish-grey color of the median space, by the hardly constricted, straighter median band of the posterior wings and paler basal shade; the anterior wings are not produced at the apex and the coloring of the under surface is paler than in *C. palæogama.*

Catocala Clintonii, nov. sp. Plate 3, fig. 4. ♀.

Anterior wings uniformly pale greyish, faintly tinged with greenish except along the costa. Basal half line black, distinct, joining inferiorily a broad blackish streak which extends in a straight line from the base of the wing to the transverse anterior line which latter it joins at its center. Transverse anterior line distinct, preceded by a lighter shade, with a subcostal tooth, hardly undulate, with a single dentation on vein 1. Median space with a slight pale brownish tinge anterior to the reniform spot and suffusing the sub-reniform spot. Reniform spot moderate, oval, pale, with a whitish ringlet, surrounded by a black costal streak; sub-reniform rounded, pale brownish, ringed with a brown line, open posteriorily. Transverse posterior line sub-dentate, with two prominent teeth, broadly marked with brownish black at its last inflexion at internal margin. Subterminal line greyish, hardly indicated; terminal space streaked with blackish along veins 2, 6 and 7, the rest of the veins in the terminal space greyish sprinkled with blackish atoms. Posterior wings light yellow; median band black, broadly constricted on the disc, straight, slightly narrowing towards internal margin, joining a faint blackish basal shade at external margin. Terminal band black, continued, leaving a yellow space at external angle, regularly undulate, constricted anterior to anal angle. Under surface of wings pale luteous, darker shaded towards the base, median bands black, tapering towards either margin. Thorax, tegulæ and collar greyish, latter bordered with black with a central whitish line; tegulæ with an anterior brown spot bordered with whitish; abdomen slightly luteous above, paler beneath; legs grey, middle tibiæ streaked with brownish black, anterior and posterior tibiæ grey. Exp. $2\frac{2}{10}$ inches.

Hab. Eastern States.

A ♀ specimen in good condition given me by Mr. Wm. A. Nason, and now in the Coll. Ent. Soc. Philadelphia. A very distinct species of more robust form than *C. polygama* Guenée.

Named in honor of Hon. Geo. W. Clinton, President of the Buffalo Society of Natural Sciences.

GEOMETRINA, H-S.

Epione depontanata, nov. sp. Plate 2, fig. 7. ♂.

Anterior wings pale brownish, median space citron yellow superiorily, external margin with a moderate angle at the extremity of vein 4. Basal space pale fawn color, slightly purplish at costa and showing several minute streaks. Median space narrow, owing to the propinquity of the median lines which latter are pale brownish, ill defined, the transverse anterior regularly undulate, forming three curves, the first of which rather the most prominent; transverse posterior line somewhat arcuated superiorily, slightly dentate, followed by a row of minute white dots on the veins. Median space citron yellow superiorily till below the median vein, becoming pale fawn color towards the internal margin, showing some costal brownish marks and a distinct black discal dot. Terminal and subterminal spaces evenly colored, pale brownish; subterminal line indicated by minute blackish dots on the veins, joining at the costa a sub-apical purplish semi-circular spot, open at the costa. shaded inwardly with whitish, margined by a darker line which is somewhat dentated postériorily, straight anteriorily. The terminal and subterminal spaces at internal angle, and along the transverse posterior line inferiorily, are sparsely and irregularly sprinkled with blackish marks. Posterior wings resembling anterior, external margin acutely angulated; basal space pale fawn color along internal margin, superiorily of the same yellow as on the anterior wings; median line brownish, appearing as the continuation of the transverse posterior on the anterior wings, with similar white dots on the veins; subterminal line as on anterior wings indicated by blackish dots on the veins, most prominent at anal angle. Under surface of both wings yellowish, tinged with orange, irregularly speckled with purplish marks and showing on the anterior pair a disconnected subterminal and median line emanating at the costa from a purplish sub-apical mark which is bordered posteriorily with whitish. Abdomen and thorax pale fawn-color, head above, purplish; legs pale fawn-color, sparsely speckled, anterior tarsi and tibiæ purplish on their upper surface, hind tibiæ moderately incrassated; antennæ simple. ♂. Exp. 1$\frac{4}{10}$ inches.

Hab. Maryland. (Coll. Ent. Soc. Philadelphia.)

Tetracis lorata, nov. sp.

Anterior wings entirely pale-yellow, without markings of any kind except an oblique, distinct, nearly straight ochraceous stripe, which traverses the wing from the costa, near the apex, to internal margin. Posterior wings white, silky, immaculate, with a slight pale yellowish tinge along the external margin which is rounded in both sexes. Thorax and head pale-yellowish; abdomen whitish, immaculate; legs whitish, the anterior tibiæ and femora slightly touched with ochraceous; eyes pale brownish. The external margin of the anterior wings is prominently angulated at the extremity of the first inferior vein, and the apex is acute, in the ♀, while in the ♂ the external margin is almost rounded and the apex obtuse, as is the case with its congeners. Exp. 1¼ to 2 inches.

Hab. Eastern and Middle States. (Coll. Ent. Soc. Philad.)

This species is readily distinguished from the already described N. American species of this genus by its immaculate wings, which are utterly destitute (♂ & ♀) of other ornamentation than the single ochraceous stripe on the anterior pair. It would appear to be allied to *T. Cachexiata* Guenée, a species described from New Holland, while it forms a group in the genus characterized by the hardly angulated external margin of the posterior wings.

A few Lepidoptera Heterocera received by this Society from Pike's Peak, and now contained in its Cabinet, have been determined as follows. A species of *Plusia*, closely resembling the European *P. divergens*, was preliminarily described on page 274 of the 2nd volume of these Proceedings, as *P. ignea* Grote; while still considering the species as distinct from its European ally, it is believed to be the species described as *P. alticola* Walker, with which description the specimen sufficiently corresponds; the name given it in these pages is accordingly withdrawn. Besides the below enumerated, determined specimens, individuals were received belonging to the genera Hadena. Anarta, and Cidaria, but their insufficient preservation prevented their specific determination.

Deilephila lineata, Fab.
Omoiala vermiculata, Grote.
Ctenucha Cressonana, Grote.
Coloradia Pandora, Blake.
Anatolmis Grotei, Packard.
Plusia alticola, Walker.
Platæa californiaria, Herrich-Schæffer.
    Gorytodes uncanaria, Guenée.
Cidaria albofasciata, Grote.

The latter species, described originally under Baptria, is more correctly referred to its present genus.

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List of a Collection of LEPIDOPTERA HETEROCERA, taken near Williamstown, Mass.

BY AUG. R. GROTE,
Curator of Entomology, Buffalo Society Natural Sciences.

A small collection of Lepidoptera taken in the immediate neighborhood of Williamstown, Mass., during the season of 1863, by Mr. Wm. A. Nason, having been submitted to me for determination, I have prepared the following list, in the expectation of its being of interest in regard to the distribution of the species and as a contribution to the Lepidopterous History of the locality in which they were collected.

Limacodes fasciola, H-S.
    L. laticlavia, Clemens.
Harrisina americana, Boisd.
    P. dispar, Harris.

Ctenucha virginica, Charp., Grote.
C. latreillana, Kirby, Auct.
Sphinx kalmiæ, Abb. & Sm.
Darapsa myron, Cramer.
S. pampinatrix, Abb. & Sm.
Ceratomia quadricornis, Hüb.
Smerinthus excæcatus, Abb. & Sm.
juglandis, Abb. & Sm.
Tropaea luna, Drury.
Samia cecropia, Linn.
promethea, Drury.
Telea polyphemus, Fab.
Hyperchiria io, Fab.
Anisota* **pellucida**, Abb. & Sm.
rubicunda, Fab.
Tolype velleda, Stoll.
Clisiocampa americana, Harris.
C. decipiens, Walker.
P. castrensis, Abb. & Sm.
Clisiocampa sylvatica, Harris.
P. neustria, Abb. & Sm.
Platycerura furcilla, Packard, MSS.
Nadata gibbosa, Abb. & Smith.
Eumetopona ministra, Drury.
Edema albifrons, Abb. & Sm.
unicornis, Abb. & Sm.
concinna, Abb. & Sm.
Notodonta basistriens, Walker. Plate ~~II~~ 1, fig. 1. ♂.

A single ♂ specimen which I figure as the species appears to be rare and not generally identified in collections.

Notodonta stragula, nov. sp. Plate 1, fig. 2. ♂.

Anterior wings slatey-grey, shaded with pale buff along internal margin, with a chestnut-brown basal patch and some brown streaks and spots in the terminal space, internal margin crested. Extreme base of the wing brownish; basal line distinct; sub-basal space large, greyish at costa, rich chestnut-brown below the median vein, pale buff along the internal margin which latter shade extends from base to internal angle. A very dark brown streak extends from the basal line to the transverse anterior line below the median vein, and a similar streak at internal margin. Transverse anterior line dark brown, greyish at costa, undulate, bordered anteriorily by a pale buff shade from below the sub-costal vein to internal margin. Median space widest at costa, narrow at internal margin, greyish, with an elongate pale discal spot with dark brown center. Transverse posterior line cinereous, indistinct, sub-dentate, continued. Terminal space with a series of rich chestnut-brown streaks between the veins, two more, linear, near the apex. Posterior wings pale cinereous with two indistinct median bands, anal angle touched with brownish. Thorax and collar brownish; tegulæ greyish; abdomen cinereous, slightly brownish above. Under surface of thorax and inside of legs brownish, outside of legs and sides of thorax clothed with cinereous hairs. Exp. $1 \frac{6}{10}$ inch.

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*This generic name proposed by Hübner in his Verzeichniss, has priority over Harris' Dryocampa; the N. A. species are as follows:

Anisota pellucida,
Dryocampa pellucida, Harr.
Anisota senatoria,
Dry. senatoria, Harr.
Anisota bicolor,
Dry. bicolor, Harr.
Anisota stigma,
Dry. stigma, Harr.
Anisota rubicunda,
Dry. rubicunda, Harr.

A single ♂ specimen in good preservation.

Nerice bidentata, Walker.

Chilodasys biguttata, Packard, MSS.

A large ♂ variety, having the collar, tegulæ and anterior wings suffused with dull blackish.

Eudryas grata, Fab.
Orgyia leucostigma, Abb. & Sm.
Halisidota tessellaris, Abb. & Sm.
Halesidota antiphola, Walsh.
Halisidota caryæ, Harris.
L. caryæ, Harr.
H. annulifascia, Walker.
Arctia virgo, Linn.
C. parthenice, Kirby.
Arctia isabella, Abb. & Sm.
Spilosoma acrea, Drury.
virginica. Fab.
Hypercompa militaris, Harr. *var.* lecontei, Boisd.
C. leucomelas, H-S.

A single specimen, showing the white spots on the anterior wings much reduced; Herrich-Schæffer's figure represents an intermediate individual in which the spots are nearly confluent.

Hypoprepria fucosa, Hübner.
L. miniata, Kirby.
G. vittata, Harris.
Nudaria mendica, Walker.
E. biseriata, H-S.
Lacinia cymatophoroides, Guenée.
Microcœlia diphtheroides, Guenée.
obliterata, Grote.
Diphthera græfii, Grote.

A ♂ specimen; the anterior wings are more uniformly greyish above than in the ♀; head white above, with a transverse black streak between the eyes, below the antennal insertion. I have this species also from Canada West.

Xanthia gilvago, W. V.

A ♀ specimen corresponding with my European specimens of this species and from which I cannot separate it. The species has not been heretofore noticed as occuring on this Continent.

Cirrœdia pampina, Guenée.
Gortyna cataphracta, Grote.
nebris, Guenée.
nitela, Guenée.
Hydrœcia nictitans, Linn.
lorea, Guenée.
Leucania pseudargyria, Guenée.
pallens, Linn.
Amphipyra pyramidoides, Guenée.

An individual included, was taken in Minnesota, and showed no variation from Eastern specimens.

Agrotis suffusa, W. V.
A. telifera, Harris.
jaculifera, Guenée.
tessellata, Harris.
clandestina, Harris.
N. lubricans, Guenée.
plecta, Linn.
Celæna herbimacula, Guenée.
C. renigera, Steph.
Eurois imbrifera, Guenée.
Hadena arctica, Boisd.
H. amica, Harris.
xylinoides, Guenée.

- **Apamea finitima,** Guenée.
    - **? insignata,** Walker.
- **Xylophasia lignicolora,** Guenée.
- **Phlogophora iris,** Guenée.
- **Cucullia umbratica,** Linn.
    - **postera,** Guenée.
    - **asteroides,** Guenée.
- **Alaria florida,** Guenée.
- **Scoliopteryx libatrix,** Linn.
- **Plusia præcationis,** Guenée.
    - **æreoides,** Grote.
    - **festucæ,** Linn.
    - **calpoides,** Grote, MSS.
- **Parthenos nubilis,** Hübner.
- **Catocala amatrix,** Hübner.
    - *C. selecta,* Walker.
    - **concumbens,** Walker.
    - **briseis,** Edwards.
    - **clintonii,** Grote.
- **Parallelia bistriaria,** Hübner.
- **Drasteria erichtea,** Cram.
- **Homoptera,** spec. indeterm.

A badly denuded specimen apparently referable to *edusa* Drury.

- **Placodes cinereola,** Guen.
- **Chamyris cerintha,** Treits.
- **Hypena scabra,** Fab.
- **Desmia maculalis,** Westw.
- **Eutrapela clemitaria,** Abb. & Sm.
- **Chœrodes transversata,** Drury.
- **Endropia serrata,** Drury.
    - **muzaria,** Walker.
    - **tigrinaria,** Guenée.
- **Angerona crocataria,** Fab.
    - *T. citrinaria,* Hübn.
- **Ellopia ribearia,** Fitch.
- **Tetracis crocallata,** Guenée.
    - **lorata,** Grote.
- **Probole alienaria,** H-S.
- **Amphidasys cognataria,** Guenée.
- **Phibalapteryx intestinata,** Guenée.
- **Boarmia,** spec. indeterm.
- **Microgonia vestitaria,** H-S.
    - *N. filamentaria,* Guen.
- **Corycia vestaliata,** Guen.
- **Hœmatopis grataria,** Fab.
    - *H. saniaria,* Hübn.
- **Cidaria diversilineata,** Hübn.

Synopsis of the BOMBYCIDÆ of the United States.

BY A. S. PACKARD, JR.

LITHOSIIDÆ AND ARCTIADÆ.

This revision of our *Bombycidæ* is prepared from materials which have been accumulating for a future monograph of this interesting and beautiful family. It is simply a synonymical list of described species, with the characters of new genera and species. Our material has been scanty, and by no means represents fairly a group which is so largely developed in North America; as it is, the mass of specimens were collected in New England and the Middle Atlantic States, with a few from California and the British Provinces.

The principal sources from which the specimens were obtained, are: the Museum of Comparative Zoology at Cambridge, Mass.; the collection of Dr. T. W. Harris in the possession of the Boston Society of Natural History; while Mr. F. G. Sanborn of Boston, has generously thrown open his own collection to me, and that belonging to the Massachusetts State Museum, accumulated chiefly through his own exertions, and I am indebted to him for continued favors while preparing this paper. Mr. A. R. Grote, of New York, has not only freely given me nearly every thing of value in his own collection, but has been indefatigable in securing from other collections the loan of many rarities. Acknowledgements will be found in their proper places of material aid from Messrs. W. H. Edwards of Newburg, N. Y.; Stephen Calverley of New York; J. W. Weidemeyer of New York; C. A. Shurtliff of Brookline, Mass.; Mr. S. H. Scudder of Boston; Mrs. J. Bridgham of New York; Messrs. M. B. Blake of Gilmanton, N. H.; S. I. Smith of Norway, Me.; L. Trouvelot of Medford, Mass., who has been especially successful in raising rare Limododes and Notodontians and other genera of this group, and in faithfully delineating their forms. I should notice also the aid received from Miss A. M. Edmands of Salem, Mass.; Messrs. W. Saunders of London, Canada West; A. E. Verrill, Cambridge, Mass.; Prof Miles of the State Agricultural College, Lansing, Mich.; and Mr. F. W. Putnam of Salem, Mass.

The valuable alcoholic collection of this family in all stages of growth, and the fine European collection in the Cambridge Museum, have been of essential service in comparing those genera common to both countries. Its collections also contain numerous specimens collected mostly about Cambridge by Mr. A. Agassiz, a few collected by J. A. Allen of Springfield and A. P. Cragin. The Californian species mentioned below were in part collected by Mr. Agassiz, and form but a small portion of the valuable collections of insects which he made in that State. Mr. Edwards also placed in my hands a small collection from San Francisco, which was formed, I believe, by Dr. Behr of that city.

Dr. Harris' collection was especially rich in Limacodes and allied genera, and in the Notodontians, and for an opportunity of consulting this collection at a time when it was not generally open to the public, I am indebted to the kindness of the Curator of Entomology, Mr. Scudder. Dr. Harris' MSS. descriptions and drawings of the members of this family have been often of aid in limiting and grouping the genera.

Subfamily LITHOSIINÆ Stephens.

HYPOPREPIA Hübner.

Hypoprepia fucosa Hübner.

Hypoprepia fucosa Hübn., Zutr. Dritt. Hand. p. 21, fig. 471, 472. (1825).
Lithosia miniata Kirby, Fauna Bor.-Amer. Pt. IV, p. 305. (1837).
Gnophria vittata Harr., Rt. Ins. Mass. p. 241. (1841).
Hypoprepia fucosa Walk., B. M. Cat. Lep. p. 487. (1854).
Lithosia miniata Walk.. B. M. Cat. Lep. p. 512. (1854.)
Atolmis tricolor Fitch, Third Rt. Ins. N. Y. p. 168. (1856.)
Atolmis? miniata Clemens, Proc. Acad. Nat. Sc. Phil. p, 543. (1860).
Gnophria vittata Morris, Synopsis Lep. N. Amer. p. 256. (1860).
Hypoprepia fucosa Hübn. Morris, Syn. Lep. N. Amer. p. 303. (1860).

Maine (Verrill). Mass. (Sanborn, Shurtleff). Mich. (Miles).

Hypoprepia Packardii Grote.

Hypoprepia Packardii Grote, Proc. Ent. Soc. Phil. ii, p. 30, pl. 2, f. 5. (1863).

LITHOSIA Fabr.

Lithosia argillacea n. sp.

Slate-color and yellow. Lustrous slate-color. Palpi yellow, with a few slate-colored scales near the tips. Prothorax yellow, continued on to the costa of the primaries on the upper and under side of the wing, nearly to the apex. Costa of secondaries also tinged with yellow.

Coxæ of the three pairs of legs yellow, as is also the tip of the abdomen.

Length of body .32; Exp. wings 1.10 inches.

Cutler, Me., July, (A. S. P., Jr.) Andover, Mass. (Garland).

CRAMBIDIA nov. gen.

Head much as in Lithosia, but the front converges more anteriorly, and the scales are coarser and longer. Antennæ setose, otherwise simple, but a little stouter than in Lithosia and the porrect palpi are larger, extending a little farther out beyond the front.

Body as in Lithosia. Primaries narrow oblong, one-third as broad as long. Costa convex, apex sub-rectangular, outer edge very straight, one-fourth as long as inner edge. Nervures remarkably equidistant. Costal midway between the marginal and s. c. nervure, 1st. s. c. very short, arising remote from the 2d, and terminating on the costal, which last is very long. 2d terminating on costa, opposite the fork of the 3d, which last encloses a long narrow apical interspace; 5th, independent. *But two m. nervules*, the nervure subdividing much within the middle of the wing.

Secondaries broad triangular, reaching beyond the tip of the abdomen, of much the same form as in Lithosia, but two m. nervules arising in the middle of the wing. Legs stouter than in Lithosia, with much larger spurs. Abdomen with a prominent tuft.

Not only of smaller size than Lithosia, but differing in the straight outer edge and convex costa of primaries, and in the neuration, throughout; since Crambidia has one-half shorter s. c. nervules, and the 5th is situated nearly in the middle of the wing; and I can discover but two m. nervules, while Lithosia has three. Also in Lithosia, the median nervure subdivides on the inner third of the secondaries; in our genus at the middle of the wing. When at rest the wings are folded flat upon the abdomen, much as in Lithosia.

Crambidia pallida n. sp.

Of a very uniform drab color, without any markings. Head and thorax tinged a little darker, while the nervules are very slightly paler. Secondaries very little paler than the front wings.

Length of body .35; Exp. wings .85–.90 inch.

♂ Mass. (Sanborn). ♀ Brunswick, Me., August 6th.

EUSTIXIS Hübner.

Eustixis pupula Hübner.

Eustixis pupula Hübn., Zutr. Dritt. Hand. p. 24, fig. 489, 490. (1825).
Eustixia pupula Walk., Cat. Lep. B. M. II. p. 522, 528. (1854).
Eustixia pupula Morris, Synopsis Lep. N. Amer. p. 252, 306. (1860).

? Locality. (Edwards).

MIEZA Walk.

Mieza igninix Walk.

Mieza igninix Walk., Cat. Lep. B. M. II. p. 527. (1854).
Morris, Synopsis Lep. N. Amer. p. 253, 306. (1860).
Mieza subfervens Walk., Cat. Lep. B. M. II, p. 528. (1854).
Morris, Synopsis Lep. N. Amer. p. 253. (1860).

Eastern Florida, U. S., Doubleday, (Walker).

CLEMENSIA* nov. gen.

Head large: front broad, clypeus triangular, very broad between the antennæ. Antennæ very slender, simple, with fine setæ beneath; ♀ still more filiform and without setæ. Palpi, 3 jointed, free from the head, porrect, the whole of the third joint reaching beyond the front of the head, and only one-fourth shorter than the 2d joint, acutely pointed. Maxillæ long and slender, reaching to the second pair of coxæ when extended.

Thorax just as long as broad, of equal width with the abdomen. The prothorax is badly separated from the meso-thorax. Patagia slight, not reaching beyond the base of the meso-scutellum.

Primaries a little more than twice as long as broad. Costa continuously convex from base to sub-acute apex; outer edge very oblique, a little more than half as long as the inner edge, which is especially convex at the basal half. Costal region very broad, 1—4th s. c. nervules very short, equal in length and going rapidly to the costal edge; the 5th subdivides within its middle, and the triangular interspace between the two branches is twice as long as broad. 6th s. c. and 1st m. nervules are parallel and of the same length. The three first m. nervules arise very near together, while the 4th is remote as usual, and arises just within the middle of the length of the wing.

Secondaries broad triangular, reaching to the base of the anal tuft, apex a little produced; costa convex throughout from base to apex, internal angle well rounded. S. c. subdivides midway between the apex and discal nervules, enclosing a triangular space. The three upper median nervules are very approximate, their interspaces narrow, linear. Legs long, slender, with 4 sub-equal, very long acute tibial spurs which are a little shorter in the ♀. Abdomen stout, broad as the thorax and four times as long. In ♂ a broad obtuse anal tuft, in ♀ its cylindrical tip is suddenly truncate, not narrower than the base of the abdomen. In coloration the single species known is white, with black scales and spots resembling the spotted species of *Hyphantria*.

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* Dedicated to Dr. Brackenridge Clemens, whose entomological studies have placed him among the first of our living lepidopterists.

It is closely allied to and yet very distinct from *Miltochrista rosea* Hübner of Europe. It nearly equals it in size, but the head is broader between the antennæ which are stouter, and the palpi are larger and longer. The costæ of the wings are fuller, the outer edges more oblique and consequently the apex more acute than in *Miltochrista*. The neuration is very different from the European genus, since the s. c. nervules are shorter, the 3 first median nervules much nearer at their origins and throughout their length, and the 4th m. arises near the middle of the wing, while in *Miltochrista* it arises at the basal third of the wing. In the secondaries the triangular apical interspace is shorter and broader in *Clemensia*. The legs are longer, slenderer, as are the tibial spurs which are nearly twice the size as those in *Miltochrista*.

Clemensia albata n. sp.

White with ashen and brown scales, dark spots and a black lunate discal spot. Front greyish white. Edges of the prothoracic scales pure white. Thorax and abdomen with greyish scales; anal tuft white.

Primaries with six or seven black costal spots. Midway between the base of the wing and the discal spot, is a sinuate abbreviated line proceeding from the 4th costal spot to just below the median nervure. A dot below on the internal nervures. A slight black streak on each side of the 4th m. below the discal spot. Between this median spot and the base of the wing is, in the ♂, a slightly tawny discoloration. Outer edge of the wing clear white. Marginal row of black dots fine, but very distinct. Fringe clear white.

Secondaries white but finely dusted with grey scales, gathered into a diffuse very indistinct extra-mesial line. No discal dot.

♀ is clearer white, the extra-basal line is much less distinct than in ♂, consisting of a linear spot, connected with the costal one.

Length of body .35 ♀ .30. Exp. wings ♂ .83 inch.

Norway, Me. (Mus. Comp. Zool., Smith). Brunswick, Me., August.

EUPHANESSA* nov. gen.

The head is much elevated behind the antennæ, the epicranium divided on its surface into two bosses. Clypeus much elevated, surface convex. The front narrows rather rapidly anteriorly. Antennæ simple scaled above and on the sides, setose beneath. Palpi porrect, passing nearly one-half their length beyond the front. Primaries two-thirds as broad as long; costa rounded towards the apex. Outer margin oblique, almost as long as the inner margin. Internal angle rounded. Costal nervure bent down towards the subcostal, parallel at its termination with the three s. costal nervules. A scalene triangular area below the s. costal; one of the two shorter sides of which consists of the common base of the 4th and 5th s. costal; the other, by the anastomosis of the 4th s. costal with its main nervure. The 1st median becomes independent, arising from the middle of the discoidal area.

Secondaries nearly as large as the primaries, very broad. Outer margin full rounded; internal angle about midway in the wing, the internal edge being short. Scales minute, thin, wings semi-transparent in spots.

This genus differs from *Nudaria* with which it has been confounded by Walker and subsequent writers, in the smooth finely scaled narrower front, while the antennæ are not tufted at the base as in the European genus. Besides, the palpi are much longer, and project far beyond the front; the triangular fore-wings are much broader and they have straighter costæ than in Nudaria. In the last named genus also, the inner edge is *nearly twice as long* as the outer, while in Euphanessa it is considerably *shorter* than the outer edge. The secondaries in our genus reach much farther beyond the tip of the abdomen. There are moreover constant differences in the neuration of the two genera.

Euphanessa mendica.

Nudaria mendica Walk., Cat. Lep. B. M. II. p. 576. (1854).
Eudule biseriata Herrich-Schæffer, Lep. Exot. p. 19, fig. 441. (1855).

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* *'Εν, φανης, transparent.*

Nudaria? mendica Clemens, Proc. Acad. Nat. Sc. Phil. p. 543. (Nov. 1860).
Morris, Synopsis Lep. N. Amer. p. 300. (1860).

Mass. (Sanborn). Maine; common in low swampy grounds or dry pine woods, July. London, C. W. (Saunders).

CISTHENE Walk.

Cisthene subjecta Walker.
Cisthene subjecta Walk., Cat. Lep. B. M. II. p. 534. (1854).
Morris, Synopsis Lep. N. Amer. p. 254. (1860).

U. S., Doubleday (Walker).

CROCOTA Hübner.

Crocota aurantiaca.
Eubaphe aurantiaca Hübn., Zutr. Dritt. Hand. p. 9, fig. 411, 412. (1825).
Not *Eubaphe aurantiaca* Harr., Agassiz's Lake Superior, p. 393. (1850).
Eubaphe aurantiaca Walk., Cat. Lep. B. M. II. p. 523. (1854).
Morris, Synopsis Lep. N. Amer. p. 253. (1860).

Eubaphe lobula of Hübner (Zutr. fig. 299, 300), is the type of quite a different genus from Crocota. On the other hand, judging simply from Hübner's plates, his *E. aurantiaca* is undoubtedly a true Crocota.

The specimen of *E. aurantiaca?* Harr., which was collected at Lake Superior by Professor Agassiz and is still preserved in the Museum of Comparative Zoölogy at Cambridge, though somewhat rubbed and unexpanded, I should refer to *C. ferruginosa* Walker.

Crocota rubicundaria Hübner.
Crocota rubicundaria Hübn., Zutr. Dritt. Hand. p. 28, fig. 511, 512. (1825).
Walk., Cat. Lep. B. M. II. p. 536. (1854).
Clemens, Proc. Acad. Nat. Sc. Phil. p. 541. (Nov. 1860).
Morris, Synopsis Lep. N. Amer. p. 256. (1860).

Georgia (Hübner). Mass. (Walker).

Crocota ferruginosa Walker.
Crocota ferruginosa Walker, Cat. Lep. B. M. II. p. 535. (1854).
Clemens, Proc. Acad. Nat. Sc. Phil. p. 542. (Nov. 1860).
Morris, Synopsis Lep. N. Amer. p. 255, 308. (1860).

"St. Martin's Falls, Albany River, Hudson's Bay. 'Caterpillar with fine brown hairs,' MSS. Dr. Barnston." (Walker).

N. York (Grote). Mass. (Sanborn, Mrs. Bridgham). Maine (Mus. Comp. Zool., Smith, Coll. A. S. P. Jr.).

This species varies in its shades of pale ferruginous, some being much lighter than others. One very light specimen is immaculate and without the two dusky, obscure broad extra-mesial bands which cross the primaries. The two or three sub-marginal black patches on the secondaries are often absent, and never connected in my specimens.

Two specimens have below the 4th m. on the primaries, two subequal paler round spots quite distinct, reminding us of *C. quinaria*. One (♀) of the specimens has no dark bands and spots, the other (♂) a patch at the internal angle of the secondaries. I should not consider them distinct, however. Another specimen from Mr. Sanborn has a single pale dot margined with dusky just below the origin of the 4th m. and the wing is obscurely, transversely banded, while there is a dark spot at the internal angle of the secondaries, showing a passage into the normal coloration. Mr. Sanborn has also another variety with yellowish secondaries, which possesses the two usual patches of dark near the inner angle.

I have compared thirty specimens, from Mass. (Sanborn) and Mus. Comp. Zool. (A. Agrassiz). Norway, Maine, (Smith, M. C. Z.) and Brunswick, Maine, where it is common during June and July, flying in day time; when disturbed, in open fields and pine woods in company with Geometridæ. Another remarkable variety of this species from Mr. Sanborn is immaculate, but only the body is reddish, while the primaries and thorax above are pale greyish clay color, and the hind wings are smoky clay; but beneath the costæ are orange ferruginous as usual, leaving no doubt that the specimen is a mere variation of *C. ferruginosa*.

The primaries of this species are broadest, most triangular, those of *C. brevicornis* Walker, are a little narrower, while those of *C. quinaria* Grote, are still longer and narrower, the apex being much more produced while the outer edge is more oblique than in any other species known to me.

Crocota brevicornis Walker.

Crocota brevicornis Walker, Cat. Lep. B. M. II. p. 536. (1854).
Clemens, Proc. Acad. Nat. Sc. Phil. (Nov. 1860).
Morris, Synop. Lep. N. Am. p. 255, Appendix, 307. (1860).

This species has darker primaries, without the dusky bands, with deeper vermillion secondaries, with very distinct discal spots, and a broad submarginal dark leaden band, rarely interrupted.

Mass. (Sanborn; Mus. Comp. Zool. A. Agassiz). Maine (A. S. P. Jr.)

Crocota quinaria Grote.

Crocota quinaria Grote, Proc. Ent. Soc. Phil., Vol. 1, April, 1863, p. 30. Pl. 2, fig. 2. ♀.

Generally in my specimens there are but two pale unequal spots on the primaries, and the secondaries may have the submarginal light band interrupted or continuous.

Massachusetts (Sanborn).

Crocota choriona Reakirt.

Crocota choriona Reakirt, Proc. Ent. Soc. Phil., Vol. 2, p. 371. (1864).

This must come very near the preceding species. In comparing the description of Mr. Reakirt with my specimens of *quinaria*, which usually have but two pale spots, it agrées throughout, except that the dark discal spot is not papillated with white.

"Philadelphia" (Reakirt.)

Crocota nigricans Reakirt.

Crocota nigricans Reakirt, Proc. Ent. Soc. Phil. 2, p. 371. (1864).

Philadelphia (Reakirt).

Crocota immaculata Reakirt.

Crocota immaculata Reakirt, Proc. Ent. Soc. Phil. 2, p. 372. (1864).

Var. *C. trimaculosa* Reakirt.

Philadelphia (Reakirt).

Crocota opella Grote.

Crocota opella Grote, Proc. Ent. Soc. Phil. 1. p. 345. Pl. 2, fig. 1. (1863).

Penn. (Grote).

I have been unable to see Guerin's figure of *Crocota læta* Boisduval. The figure in Griffith's "Cuvier" leads me to suppose that it is the same species as Walker's *brevicornis*.

UTETHEISA Hübner.

Utetheisa bella Hübner.

Tinea bella Linn, Syst. Nat. (1767).
Fabricius.
Drury, Illustr. ii. p. 191. Pl. 24, fig. 1. (1773).
Utetheisa bella Hübn., Verz. p. 168. (1816).
Deiopeia bella Westw., Ed. Drury i. p. 46. (1837).
Harris, Rt. Ins. Mass. (1841).
Third edit. p. 342. Pl. vi. fig. 3. (1862).
Morris, Synopsis Lep. N. Amer. p. 251. Appendix, 313. (1860).

White Mts., Md., Western States, Texas (Mus. Comp. Zoöl. A.

Agassiz). Charleston, S. C. (Scudder). New York (Grote). Md. (Weidemeyer).

The single specimen noticed from Texas affords indications of a distinct species inhabiting that section.

After the examination of over fifty specimens of this species, kindly presented me by Mr. Weidemeyer, which were collected in Maryland, I find but slight variation. Some are of richer hues than others; in some the primaries are deeply tinged, while the secondaries are not more pink than usual, or the black border of the hind-wings is remarkably slight and narrow, and in the others the black border greatly preponderates and sends in broad expansions towards the middle and costa of the wings. In many specimens two minute discal dots are absent on the hind-wings. The fore-wings vary in the relative distances apart of the bands of dots, of the breadth of the white circles around the individual dots, which may be very faint, or stand out conspicuously in the deep orange of the wings. The third band is sometimes interrupted. The accessory short sub-costal branch of the 5th band sometimes has the black spots obsolete. On the under side the costal and discal spots of both wings are exposed to considerable variation in their position and disappearance. One ♂ has lemon yellow fore-wings instead of orange, with very minute black dots, often entirely absent. It is in this specimen that the apex of the secondaries are broadly shaded with black, and the discal dot on the hind-wings is large and broad. There is no special variation in size, and only that of one line in the expanse of the wings.

Deiopeia aurea Fitch, Third Rt. Ins. N. Y. p. 168. (1856).
Morris, Synopsis Lep. N. Amer. p. 251. (1860).

"Georgia" (Fitch).

Subfamily ARCTIIDÆ Leach.

CALLIMORPHA Latreille.

Hübner's term *Hypercompa* was, as he employed it in 1806, (Sammlung Exot. Schm. Bd. 1,) not a genus, but a group (Stirps) of genera. The type of Latreille's genus was *C. Hera* which is congeneric with the species enumerated below. In 1816 Hübner (Verzeichness bek. Schm.), proposed *Haploa* for *C. clymene* Brown sp. (Illustrations of Zoology) which must be considered as a synonyme of *Callimorpha* Latr.

Without more specimens, and the works of Esper, Hübner, Beauvois and Brown at hand, where *Colona*, *Clymene* and *interrupto-marginata* are figured, I can add nothing new concerning the synonyme of the species of this genus which are exposed to such unusual variation.

Callimorpha clymene.

Hypercompa clymene Esper sp., "Schm. IV. 22, 10, pl. 182; Noct. 103, fig. 1."
Haploa clymene Hübn., Verz. p. 182. (1816). (1786).
? *C. colona* "Hübner, Eur. fig. 135." H.-Sch.
Callimorpha carolina Harr., Rt. Ins. Mass. p. 243. (1841).
Hypercompa clymene Walk., Cat. Lep. B. M. III. p. 650. (1855).
Clemens, Proc. Acad. Nat. Sc. Phil. p. 536. (1860).
" Morris Synop. Lep. N. Am. App. p. 345. (1860).
Saunders, Synopsis Can. Arctiadæ, p. 28. (1863).

New York (Edwards, Grote). "Canada, (Bethune)" Saunders.

Callimorpha interrupto-marginata.

Bombix interrupto-marginata De Beauvois, "Ins. Afriq. et Amer. p. 265. Pl. 24, fig. 5, 6." (1805).
Callimorpha anchora Harris, (MS. figs.).
Hypercompa comma Walk., Cat. Lep. B. M. III. p. 652. (1855).
Hypercompa interrupto-marginata Clem., Proc. Acad. Nat. Sc. Phil. p. 161, 536. (May and Nov. 1860).
Morris, Synopsis Lep. N. Amer. Appendix, p. 346. (1860).
Saunders, Synopsis Can. Arctiadæ, p. 29. (1863).

Connecticut, (Coll. Harris, Boston Soc. N. H.) New York (Grote). St. Catharine, C. W., (Coll. Scudder.) Mass. (Trouvelot).

Callimorpha Lecontei Boisd.

Callimorpha Lecontei Boids., Guerin, Icon. Regne An. Griffith's Cuvier An. Kingd. Plate 32, fig. 4. (1831).
Callimorpha militaris Harr., Cat. Ins. Mass. (Hitchcock's Geol. Rt.) p. 592. (1833). Rt. Ins. Mass. p. 243. (1841). Third Edit. fig. 165. (1862).
Hypercompa Lecontei Walk., Cat. Lep. B. M. II. p. 651. ( ).
Callimorpha leucomelas H.-Sch., Lep. Exot. p. 17, fig. 431. (1855).
Callimorpha Lecontei H.-Sch., Lep. Exot. p. 72. (1858).
Hypercompa Lecontei "var. of *militaris*", Clem., Proc. Acad. Nat. Sc. Phil. p. 536. (Nov. 1860). Saunders, Synopsis Can. Arctiadæ, p. 28. (1860).

St. Louis, (Mus. Comp. Zool. A. Agassiz). New York (Edwards). Mass., (Sanborn, Shurtleff.)

Callimorpha confinis.

Hypercompa confinis Walk., Cat. Lep. B. M. III. p. 651. (1855).
Clem., Proc. Acad. Nat. Sc. Phil. p 43. (Nov. 1860).
Morris, Synopsis Lep. N. Amer. Append., p. 345. (1860).
Saunders, Synopsis Can. Arctiadæ, p. 28. (1863).

Callimorpha contigua.

Hypercompa contigua Walk., Cat Lep. B. M. III. p. 652. (1855).
Clem., Proc. Acad. Nat. Sc. p. 536. (Nov. 1860).
Morris, Synopsis Lep. N. Amer. Appen., p. 346. (1860).
Saunders, Synopsis Can. Arctiadæ, p. 26. (1863).

Callimorpha fulvicosta.

Hypercompa fulvicosta Clem., Proc. Acad. Nat. Sc. Phil. p. 536. (Nov. 1860).
Saunders, Synopsis Can. Arctiadæ, p. 27. (1863).

Callimorpha vestalis n. sp.

♂ & ♀. Pure immaculate milk-white, ♀ white. Tips of the palpi brown. Head and prothorax, basal half of the patagia and costa of both wings above and beneath yellow. The legs are also yellow beneath. The abdomen is white and unspotted. Antennæ brown. Body ♂ .65, ♀ .65. Exp. wings ♂ 1.70, ♀ 1.70 inch.

Middle Atlantic States. (Coll. Ent. Soc. Phil., through A. R. Grote.)

This species of which I had a ♂ and ♀ each differs remarkably from the other species in being of a nearly pure white, and of smaller size. The broader triangular primaries, the fine scales on the body, and the short angular hind wings will distinguish it readily from the white variety of *Euchætes egle.*

EPICALLIA Hübner.

This genus differs from the closely allied *Pericallia* and *Euprepia* in the hardly oblique outer margin of the fore wings, and the straight costa.

Epicallia virginalis.

Chelonia virginalis Boisd., Lep Cal. (Ann. Ent. Soc. France), p. 49. (1852).
Arctia virginalis Walk., Cat. Lep. B. M. III. p. 611. (1855).
Morris, Synopsis Lep. N. Amer. Appendix, p. 337. (1860).

The angular outer edge of the hind wings of the European *Epicallia villica* give the wing a triangular form, which becomes subovate in the Californian *E. virginalis.* Now the European species *villica* imitates in this respect the European genera *Pericallia* and *Euprepia.* Thus the Californian species, which is moreover finely scaled, agrees best with *Callimorpha*, which is a truly American genus; for we would consider the single European species *C. Hera* as the most aberrant form in the genus, since it simulates in its colors other strictly European genera. On the other hand, we would consider that in the genus under consideration the European *villica* is the more aberrant form, since it is evidently influenced by the hairy genera with which it is associated. *E. virginalis* also differs structurally from the European species in having the antennæ nearly simple; the median nervules longer; while the third median is nearer the second than in *villica*. These facts show the importance of studying all the species of a genus which ranges over two continents, in order to properly appreciate the characters of the genus itself, and to see how those characters are apparently swayed and influenced on the one hand by the proximity of other genera in one and the same province; and on the other, by the strong influence of a corresponding geographical province.

Thus in illustration:—the American genera of this sub-family are more generally white and finely scaled, i. e. *Callimorpha*, *Leucarctia*, *Seirarctia*, *Halesidota*, *Ecpantheria* and allies, and *Euchætes*, while in Europe they are more prevalent red and brown, and wooly genera, such as *Oneogyna* and the numerous species of *Arctia*.

However, this state of things is reversed in the genus *Callarctia* (*Chelonia* Godt.) Here the Californian species is *pilose* and the abdomen is slender, while the European species are *finely scaled* and have obtuse abdomens.

A single specimen from San Francisco, Cal., now in the Mus. Comp. Zoöl. was collected by A. Agassiz.

Herrich-Schæffer figures (Lep. Exot. Sp. Nov. p. 72, fig. 464) *Pleretes guttata* in illustration of Boisduval's *Agarista guttata* (Lep. Cal. p. 48, 1852). The last named author gives us too meagre a description of the species for us to know whether it is a Zygænid or not. H.-Schæffer's figure represents a species so closely allied to *E. virginalis* as to lead us to suspect that it is but a variety of that species. It seems to differ in having dark secondaries, with a single light dot, but otherwise answers to Boisduval's description of *E. virginalis*.

PLATARCTIA* nov. gen.

Head prominent; front square broad, moderately pilose, hairs on the front margin converging to a point. Palpi long, pointed, porrect, extending one-half their length beyond the front. Antennæ moderately pectinated, in ♀ subsimple, serrated, the teeth terminating in setæ.

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*πλατὺς *broad*, Arctia.

Thorax stout, pilose. Prothorax gaily colored. Patagia not very distinct. Primaries broader than usual, triangular; breadth more than one-half as great as their length. Costa convex throughout, especially towards the apex, which is subrectangular, hardly obtuse: outer margin oblique, nearly straight; inner angle distinct. The nervules are wider apart, and the median nervules are bent downwards towards the internal angle more than usual.

Secondaries broad triangular, reaching beyond the abdomen in both sexes farther than usual. Costa long, hardly convex; apex a little produced, rounded; outer margins hardly convex, parallel with the costa.

Legs moderately stout. Abdomen rather slender, in ♂ tapering gradually to a slight anal tuft.

Though the Californian *P. modesta* is so much smaller than the two other species that we would suspect naturally they were generically distinct, there is nothing of sufficient importance to separate the three species which approach closely the genus *Epicallia*.

In none of the species are the primaries crossed by gaily colored bands, but there is generally present a bright costal patch, while the hind wings are crossed beyond the middle, by a yellowish band.

Platarctia parthenos.

Arctia parthenos Harr., in Agassiz, Lake Superior, p. 390, vii. fig. 4. (1850).
Walk., Cat. Lep. B. M. III. p. 608. (1855).
Clem., Proc. Acad. Nat. Sc. Phil. p. 529. (Nov. 1860).
Morris, Synopsis Lep. N. Amer. Appendix, p. 337. (1860.)
Saunders, Synopsis Can. Arctiadæ, p. 4. (1863).

Soft brown and orange yellow. Head rubicund between the antennæ. Base of the pronotal pieces yellowish white. Primaries with four yellowish white costal spots, 3rd largest and followed below by the discal dot, and another larger spot on the inner margin; 4th costal spot succeeded by two spots, the lower on the internal angle. A long fascia nearly parallel to, and lying just under the base of the m. nervure.

Secondaries; blackish with a median band of approximate large orange spots of which the costal one is double. Within this last spot, the costa is orange, widening at the base. Thorax reddish beneath; femora beneath rubicund, near the tips ringed with vermillion, while the legs generally are black. Base of the abdomen reddish, below and on the sides rubicund. Beneath paler; costa and nervules red; most of the markings appear through. In the middle of the wing are two obscure yellow spots, the upper one in the 3rd m. interspace. Two smaller ones near the internal margin. Costa of the secondaries broadly tinged with red.

Length ♂ 94. Exp. wings, 2.50 inches.

♂. Lake Superior (Harr. Coll.). River Rouge, C. W., (Saunders).

A ♀ specimen taken near the summit of Mt. Washington by Mr. Scudder, differs thus: there is one more costal spot; the intra-discal spot is wanting, the costo-apical spot is much larger; there is simply a dark discoloration instead of the spot under the origin of the 4th m. The two small dots in the middle of the median band on the ♂ secondaries are wanting in Mr. Scudder's ♀. Beneath, the costo-apical spot is present, the one below single. The extra-discal dot is geminate. The middle of the wing and internal angle are orange yellow, and the costal region of the secondaries is broadly tinged with orange.

Length 1 inch. Exp. wings 2.90 inches.

These differences are, without doubt, sexual, for the sexes of the European broad wings Arctians differ greatly.

Platarctia borealis.

Arctia borealis Möschler, Beiträge zur Lepidopteren-Fauna von Labrador (Wien. Ent. Monatsl. Bd. 4. Taf. 9, f. 3. Nov. 1860).

♀. Head: vertex above and between the antennæ deep vermillion; front below brown, as in *P. parthenos*. Palpi reddish, outer half brown. Base of prothorax deep yellow, continuous with a broad yellow stripe at the lower edge of the patagia, forming a continuous band on each side of the thorax above the insertion of the wings which meets in front: while in *P. parthenos* these two lateral bands do not meet in the mesial line. Meta-thoracic hairs pale vermillion.

Primaries brown with large straw-yellow spots. A basal longitudinal spot just below the origin of the median nervure which is swollen at its outer end. A costal rather large square spot on the inner fourth of the costa, and opposite the end of the long baso-median spot. Beyond are three large costal spots forming the termini of the three oblique bands of mostly large yellow angulated spots; the inner consisting of three spots, the costal being long and narrow, and the lower one the smallest and opposite the baso-median spot. The second line of spots is interrupted on the origin of the upper three median nervules. The lowest spot is largest and triangular, the succeeding one in the 3rd m. space is sublunate and oblique. The three costal and subcostal ones are united; the outer and submarginal row is dislocated on the lower subcostal; the lower portion consisting mostly of lunate spots, the upper one rounded, while the costal spot in the upper portion which is set back from the apex, is connected with the second small spot, forming a produced triangle.

Secondaries orange-yellow. Two transverse broad bands, the inner very irregular, crossing the wing a little beyond the inner third, expanding very much outwards towards the long discal spot which is bent inwards somewhat. Below it dilates inwards and continues along just beneath the median nervure. It also runs along the internal margin of the wing to the base, thus leaving but two long yellow stripes, one above, the other below the m. nervure. The outer submarginal band is regular, except that it is dilated outwards a little in the discal space, and expands upon the costa.

Beneath, both wings are yellow, while the costæ and nervules of both are vermillion. Base of the primaries with a blackish discal discoloration. In the sub-m. space are three blackish spots; the middle one rounded lunate, and twice as large as the inner, while the outer one is geminate. In the middle of the discal space is a transverse spot aligned with the lunate spot below. The yellow spots are faintly reproduced beneath, surrounded by a brown tinge. On the under side of the secondaries the discal spot is nearly obsolete; the inner band does not reach the costa, and the outer band only reaches half across the wing.

Legs: femora vermillion; tibiæ black above; basal and terminal joint black. Abdomen black above. Sides, the two terminal segments and under side pale rubicund.

Compared with Möschler's figure of the ♂, the spots on the primaries in our ♀ specimen are larger and heavier, and the outer band on the secondaries is broader and more regular, while the black portion extends nearly to the tip of the abdomen, being much farther than in the ♂, where also the middle discal spot on the primaries is wanting.

Length, ♀, 1 inch. Exp. wings, 2.35 inches.

Quebec (Auth. Edwards).

This species is a little smaller than *P. parthenos;* the apex of the primaries is more rounded, and the whole wing is hardly so broad, and the spots are larger, more numerous, and of a much deeper yellow. In the hind wings the internal angle is more rounded, and the outer edge is more convex; the two black bands narrower, and the discal reniform dot is farther removed from the inner band than in *P. parthenos*.

Platarctia Scudderi n. sp.

♂. Brownish black. Sides of the prothorax orange. Two whitish bands on the fore wing; one lying just under the base of the median nervure, as long as the thorax; the other transverse running from just above the internal angle to the outer third of the costa. The middle of the patagia is whitish, and there are two curved narrow lines on each side of the meso-scutum. The tips of the palpi, and the ends of the femora above, and the tibiæ and tarsi are very pale yellowish white, concolorous with the bands on the thorax and primaries.

Secondaries entirely brownish black and concolorous with the fore wings.

Length of body, .45; length of primaries, .65 inch.

This species is intermediate in size between *P. borealis* and *modesta*, and is easily distinguished by its simple markings, chiefly consisting of a basal longitudinal and transverse sub-apical band.

Collected by Mr. S. H. Scudder on the Saskatchewan River, Brit. America.

Platarctia modesta n. sp.

♂. Brown, head and thorax darker. Patagia with a pinkish white stripe, preceeded by two dots on the prothorax and at the base of the antennæ, with a few concolorous scales on the vertex. Primaries with a light costal spot, connected with the discal dot. A concolorous spot on the internal angle. A large spot at the base of the m. nervure.

Secondaries mostly darker, with a broad light pinkish mesial band. Outer margin interrupted by eight spots. Beneath, the primaries are pinkish-yellow at their base, with a dark median band; beyond paler, while the outer margin is dark. Base of the secondaries pale, otherwise as above. Legs dark.

Length, ♂ .45. Exp. wings, 1.20 inches.

California. (Mus. Comp. Zoöl. A. Agassiz.)

EUPREPIA Germar.

Euprepia americana.

Arctia americana Harr., Rt. Ins. Mass. p. 246. (1841).
Harr. in Agassiz, Lake Superior. p. 391. Pl. vii. fig. 5. (1850).
Walk., Cat. Lep. B. M. III. p. 607. (1855).
Clem., Proc. Acad. Nat Sci. Phila. p. 529. (Nov. 1860).
Morris, Synopsis Lep. N. Amer. Appendix. p. 336. (1860).
Saunders, Proc. Ent. Soc. Phila. ii. p. 28. *Larva.* (1863).
Synopsis Can. Lep. p. 3. (1863).

Mass., (Harr. Coll.)

When compared with the very closely allied *E. caja*, our species is found to have a much stouter body, and shorter wings. The antennæ of our species are provided with short but distinct pectinations: in *E. caja* they are hardly pectinated at all. In our species likewise the hind wings are yellow, while in the European representative they are plainly orange.

CALLARCTIA.*

Front vertically oblong, moderately broad, hairs closely cut. Antennæ subsimple, serrated, not pectinated being obsolete; ♀ simple, filiform. Palpi long, slender, porrect, outer third of second joint surpassing the front, third, joint slender acute. Thorax thick and densely pilose. Prothoracic pieces and patagia very distinct.

Primaries half as long as broad: costa nearly straight; apex obtusely rectangular; internal angle slowly rounded.

Secondaries reach to outer fourth of the abdomen: costa straight, apex very obtuse, sub-rectangular; the outer margin is full and somewhat rounded, bent slightly on the 2nd median and on the sub-median fold. Legs slender. Abdomen large and heavy, densely pilose.

This genus was first established by Godart, under the name of *Chelonia*, which was previously used for Mammalia in 1800. As it now stands I would restrict it to the two European species *Chelonia fasciata* and *pudica*, and to the new Californian species. It is subject to considerable variation in the palpi which are very slender in *C. fasciata*, but stouter and more pilose in *C. pudica* and *C. ornata*.

The secondaries in *C. fasciata* are shorter and rounder than in the other species; and both European species have the abdomen thicker and more obtuse and more finely scaled than in the Californian *ornata*.

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* *καλλος beautiful,* Arctia.

They all agree in being colored straw yellow, or very pale vermilion, and being thickly covered with triangular black spots, which are connected in *C. fasciata.*

Secondaries with one or two transverse rows of three or four large black spots. The genus is distinguished from *Eucharia* Hübner, its nearest ally, by its nearly simple antennæ and more slender thorax: and from *Euprepia* by its much smaller and narrower wings, the outer margin of which are less oblique in *Callarctia.*

Callarctia ornata n. sp.

♂. Very pale salmon; sides of the front, central dot of the prothoracic scales, patagia and middle of the mesonotum black. Primaries with two long broad black streaks; the one between the costal and median nervures; the other divided by the internal nervure. Two transverse spots beyond. Between this last and the submarginal row of three spots is a long narrow triangular spot reaching from the costa to the 4th m. nervule. The costal spot of the submarginal line is oblong, the two lower ones triangular. A triangular apical and median spot, the latter twice divided by the m. nervules.

Secondaries deep salmon color, with two rows of marginal round black spots; an apical and median sub-linear spot. Beneath, both wings are uniformly yellowish salmon, otherwise much as on the upper side. Abdomen with dorsal, ventral and sub-ventral rows of partially united black spots.

Length, .75. Exp. wings, 1.85 inch.

San Mateo, Cal. (Mus. Comp. Zoöl. A. Agassiz.)

ARCTIA Schk.

Arctia virgo Harr.

Bombyx virgo Linn., Syst. Nat. 10th ed. Vol. I, p. 501. (1758).
Phalæna virgo Smith, N. H. Lep. Ins Ga. p. 123. Tab. 62. (1797).
Euplagia virgo Hübn., Samml. Exot. Schm. ii. Pl. 189. (1806).
Verz. p. 180. (1816).
Arctia virgo Harr., Cat. Ins. Mass. p. 73. (1835).
Duncan, Nat. Libr. Moths and Sphinges, xxxvi. Pl. 19. (1836).
Harr., Rt. Ins. Mass. p. 244. (1841).
Walk., Cat. Lep. B. M. III. p. 608. (1855).
Clem., Proc. Acad. Nat. Sci. Phila. p. 528. (Nov. 1860).
Morris, Synopsis Lep. N. Amer. Appendix, p. 338. (1860).
Saunders, Synopsis Can. Arctiadæ, p. 6. (1863).

N. Y. (Weidemeyer, Grote). Mass. (Coll. Harris). (Mrs. Bridgham). (Mus. Comp. Zoöl).

Arctia parthenice Harris.

Callimorpha parthenice Kirby, Fauna Bor-Amer. iv. p. 204. (1837).
Morris, Synop. Lep. N. Amer. Appen. p. 339. (1860).
Saunders, Proc. Ent. Soc. Phil. ii. p. 28. (1863).
Synopsis Can. Arctiadæ, p. 5. (1863).

Mr. Saunders has shown by the larval characters that this species is quite distinct from *A. virgo.* In Maine it is our most common species, appearing late in May and August.

Arctia phalerata Harris.

Arctia Nais Hübn., Verz. p. 183. (1816).
Zutr. Dritt. Hand. p. 40, fig. 599, 600. (1825).
Arctia phalerata Harr., Cat. Ins. Mass. p. 73. (1835).
Rt. Ins. Mass. p. 245. (1841).
" " Third edit. fig. 168. (1862).
Saunders, Synop. Can. Arctidæ, p. 11. (1863).

Mass. (Harr. Coll.), (F. W. Putnam.) (Mus. Comp. Zoöl. A. Agassiz.)

Arctia Anna Grote.

Arctia Anna Grote, Proc. Phil. Ent. Soc. ii. p. 335. Pl. 8, fig. 1. (Dec. 1863).

Philadelphia, Lewis, (Grote.)

I am indebted to Mr. Grote for an opportunity of seeing his type of this fine species.

Arctia celia Saunders.

Arctia celia Saund., Proc. Ent. Soc. Phil. ii, p. 59. (May, 1863).
Synopsis Can, Arctiadæ, p. 13. (1863).

I am indebted to Mr. Saunders for an opportunity of seeing his types of this species, *A. decorata* Saund., and *A. parthenice*, and also a larva of *E. americana.* This species I have taken at light in Maine, in August. Mass. (Sanborn).

Arctia Phylira Harris.

Bombyx Phyllira Drury, Illustr. i. p. 15. Pl. vii. fig. 2. (1770).
Phalæna Phyllira Smith, N. H. Lep. Ins. Ga. p. 127. Tab. 64. (1797).
Euplagia Phylira Hübn., Verz. p. 180. (1816).
Zutr. Zeveite Hand. p. 9, fig. 215, 216. (1823).
Arctia Phyllira Harr., Cat. Ins. Mass. p. 73. (1835).
Callimorpha Phyllira Westw., Edit. Drury. (1837).
Arctia Phylira Harr., Rt. Ins. Mass. p. 245. (1841).
Clem., Proc. Acad. Nat. Sci. Phil. p. 528. (Nov. 1860).

Arctia Phylira Morris, Synopsis Lep. N. Amer. Appendix, p. 339. (1860).
Saunders, Synoysis Can. Arctiadæ, p. 11. (1863).

Mass. (Harr. Coll.) N. Y. (Edwards).

Arctia figurata Harris.
Bombyx figurata Drury, Illustr. ii. p. 22. Pl. xii. fig. 4. (1773).
Arctia figurata Harr., Cat. Ins. Mass. p. 73. (1835).
Nemeophila figurata Westw., Edit. Drury. (1837).
Morris, Synopsis Lep. N. Amer. Appendix, p. 341. (1860).

Penn. (Coll. Phil. Ent. Soc.). New York (Edwards).

Arctia Nais Walker.
Bombyx Nais Drury, Illustr. i. p. 15. Pl. vii. fig. 3. (1770).
Not *Arctia Nais* Hübn., Zutr. fig. 599, 600. (1825).
Spilosoma Nais Westw.. Edit. Drury. (1837).
Arctia Nais Walk., Cat. Lep. B. M. III. p. 609. (1855).
Clem., Proc. Acad. Nat. Sci. Phil. p. 528. (Nov. 1860).
Morris, Synopsis Lep. N. Amer. Appendix, 339. (1860).
Arctia decorata Saunders, Synopsis Can. Arctiadæ, p. 12. (1863).

Arctia virguncula Walker.
Callimorpha virguncula Kirby, Fauna Bor. Amer. iv. p. 304. Pl. 4, fig. 6. (1837).
Arctia virguncula Walk., Cat. Lep. B. M. III. p. 609. (1855).
Clem., Proc. Acad. Nat. Sci. Phil. p. 528. (Nov. 1860).
Morris, Synopsis Lep. N. Amer. Appendix, p. 338. (1860).
Arctia Nais Saunders, Synopsis Can. Arctiadæ, p. 8. (1863).
Not *Arctia virguncula* Saund., Synopsis, p. 9. (1863).

This species, specimens of which I have received from Mr. Saunders, labelled "*A. nais*," is not infrequent in Maine. It has been taken in Mass. by Mr. Sanborn. The species of this genus are difficult to describe, and difficult to recognize from description without good figures, such is their great variability. The rarity of the illustrated works in which they are first described and figured has led observers into occasional inadvertencies. Thus under the name of "*nais*", Hübner figures what is unmistakeably *A. phalerata* Harris.

Arctia Quenselii Geyer, Forts. Hübn. Zutr. Fünft. Hund. p. 14, fig. 847, 848. (1837).
Clem., Proc. Acad. Nat. Sci. Phil. p. 527. (Nov. 1860).

"Labrador" (Geyer).

Arctia gelida Mœschler, Ent. Zeit. Stettin. ix. 17, 3, 174. (1849).
Walk., Cat. Lep. B. M. III. p. 611. (1855).
Clem., Proc. Acad. Nat. Sci. Phil. p. 528. (Nov. 1860).
Morris, Synopsis Lep. N. Amer. Appendix, p. 341. (1860).

"Labrador" (Moeschl.).

Arctia hyperborea Walker.
Eyprepia hyperborea Curtis, App. Ross' Nar. 2d Voy. lxxi. 17. (1831).
Arctia hyperborea Walk., Cat. Lep. B. M. III. p. 611. (1855).
Clem., Proc. Acad. Nat. Sci. Phil. p. 529. (Nov. 1860).
Morris, Synopsis Lep. N. Amer. III. p. 340. (1860).

"Arctic America" (Ross).

Arctia dahurica Boisd. sp.
Chelonia dahurica Boisd., Lep. Cal. (Extr. Ann. Ent. Soc. France.) p. 49. (1852).
Arctia dahurica Walk., Cat. Lep. B. M. III. p. 597. (1855).
Clem., Proc. Acad. Nat. Sci. Phil. p. 527. (Nov. 1860).
Morris, Synopsis Lep. N. Amer. Appendix, p. 341. (1860).

"California" (Boisd.).

Arctia Arge Harris.
Bombyx Arge Drury, Illustr. Nat. Hist. i. p. 35. Pl. 18, fig. 2. (1770).
Phalæna Dione Smith, N. H. Lep. Ins. Ga. p. 125. Tab. 63. (1797).
Spilosoma Arge Westw., Edit. Drury. (1837).
Arctia Arge Harr., Rt. Ins. Mass. p. 241. (1841).
Arctia Dione Walk., Cat. Lep. B. M. III. p. 605. (1855).
Clem., Proc. Acad. Nat. Sci. Phil. p. 528. (Nov. 1860).
Morris, Synopsis Lep. N. Amer. Appendix, p. 3[illegible]0. (1860).
Saunders, Synopsis Can. Arctiadæ, p. 7. (1863).

N. Y. (Grote, Edwards). Mass. (Shurtleff. Sanborn. Mrs. Bridgham. M. C. Z., A. Agassiz).

In Mass. this species is not unfrequent, and it becomes more abundant as we go southward.

Arctia Placentia Walker.
Phalæna Placentia Smith, N. H. Lep. Ins. Ga. p. 129. Tab. 65. (1797).
Heraclia Placentia Hübn., Verz. p. 150. (1816).
Arctia Placentia Walk., Cat. Lep. B. M. III. p. 610. (1855).
Morris, Synopsis Lep. N. Amer. Appendix, p. 337. (1860).
Saunders, Synopsis Can. Arctiadæ, p. 5. (1863).

This species, so far as we know, has not been found outside of Georgia.

Arctia pallida n. sp.

♀ Uniform pure white, with brownish-black streaks in most of the interspaces. Palpi dark at the tips. Nervules white. Costa clear white, except a small short longitudinal linear streak on the basal fifth. Discal area brown, divided by a white streak running inwards. In the apical area is a broad brown spot, and a little farther out, just below the costa is a small linear oval dark spot. Beyond the discal space are three linear streaks, the lower one forked. In the 3rd median space is a large brown area; in the space below the long streak is separated at the outer third, corresponding to the streak lying along the internal nervure, which has a detached dark spot without, just above the internal angle. None of these streaks approach very near the outer margin. A marginal row of dark spots, some of them nearly obsolete.

Secondaries with a geminate large dark dot near the middle of the outer margin. Legs: fore tibiæ yellowish, tarsi dark above. Two posterior pairs of legs sparsely dotted with brown. Abdomen white with a median and subdorsal row of spots, and two subventral rows. Tip obtuse.

This species will be easily recognized as being pure white with dark brown streaks on the fore-wings which terminate at a distance from the edge of the wing. In structure it is by its form and narrow wings, with very oblique outer edges, like *A. arge*, and forms a passage from *Arctia* to *Sierarctia.*

Length .30. Exp. wings 1.50 inches.

New York (Calverley). I am indebted to Mr. Calverley for the loan of this fine, and apparently, very rare species.

SEIRARCTIA* nov. gen.

Owing to the fine powdery scales that cover the body, the head seems much freer from the thorax than in Arctia. The front is broader throughout, more convex, where in Arctia it narrows towards the front edge, and becomes flattened. Palpi porrect large and long, tips obtuse, surpassing the front by the entire length of the third joint. In Arctia the palpi do not reach beyond the front.

Thorax moderately stout, finely scaled. Primaries long and narrow, the breadth being contained two and one-half times in the length. Costa straight on the basal half, from thence more convex throughout than in *A. arge*. The apex is produced more than usual, obtusely pointed. Outer edge very oblique, one-half as long as the costa, and nearly equals the length of the inner edge. In the neuration this genus is more like that of Halesidota than Arctia, since the second and third subcostals are curved very near the costa. Apical interspace much larger than in Arctia, while the fifth s. c. is longer and straighter, as are the three first median nervules, the 3rd being curved more, while the semi-ovate space enclosed between the 1st and 3rd is longer and broader towards the apex than in Arctia, where it is more acute. In this respect it resembles Halesidota. 4th median curved slightly, arising much nearer the middle of the wing than in Arctia; and nearer also to the 3rd median, to which it is parallel.

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* *σειρα stripe,* Arctia.

Its affinity to Halesidota is still more striking in the form of the secondaries, which are much produced towards the apex. The costa is much bent in the middle; in Arctia it is not bent at all; and the long outer edge is somewhat angulated. Legs large and stout, finely scaled, resembling the stout finely scaled legs of Halesidota and Ecpantheria.

The species are pure white, with black stripes along the nervures, not in the interspaces as in Arctia.

In the figure of Abbot's, the larva of *S. echo* have the dorsal hairs arranged in high broad tufts which show the transition from Arctia, in the larva of which the fascicles are of uniform length, to Halesidota where the fascicles often form tufts and pencils of hairs.

Seirarctia Echo.

Phalæna Echo Smith, N. H. Lep. Ins. Ga. p. 135. Pl. 68. (1797).
Hyphantria Echo Clem., Proc. Acad. Nat. Sci. Phil. p. 531. (Nov. 1860).
Spilosoma Echo Morris, Synopsis Lep. N. Amer. Appendix, p. 342. (1860).

Seirarctia Clio n. sp.

♂. White, streaked longitudinally along the nervules with black brown. Palpi above black. Prothorax immaculate. Meso-notum with three black stripes, those of the patagia lined without with yellowish; hinder part of the thorax also yellow.

Primaries pure white; median and internal nervures lined with black, as is the internal margin partially. Ends of the 3rd subcostal, 4th and 5th s. c. entirely; 2nd median entirely, and the remaining median nervules partially black. Secondaries immaculate, except two apical minute streaks. Costæ of both wings beneath cream-white. The black markings distinct beneath. Fore-legs darker above than the others, and they are all more or less blackened at the joints above.

Exp. wings, 2.00 inches.

California (Edwards).

PYRRHARCTIA* nov. gen.

Head: front subquadrate, fuller and broader between the antennæ which are short and simple in both sexes. Palpi not reaching beyond the front, scales spreading, hardly distinct from those of the front. Clypeus short and broader in front than usual. Epicranium broad, somewhat pointed above. Labrum narrow. Maxillæ hardly longer than the head. Body stouter than usual.

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* πυῤῥός, *yellowish red,* Arctia.

Primaries narrow, much produced towards the apex. Costa convex at the outer third; apex acute; outer margin one-third shorter than the costa, 2nd subcostal arched, running near the 3rd. Upper branch of 3rd short, one-half as long as the lower. Space between the median nervules in both wings regularly semi-oval, not so acute at the end as usual, since the nervules are a little more bent outwards at their origin than usual.

Secondaries subtriangular, produced towards the apex; costa slightly convex, a little bent in the middle; outer margin convex, not reaching to the tip of abdomen. Legs stout; femora densely pilose, scales short. Tibiæ and tarsi naked. Four hind tibial spurs of moderate size. Tarsi thickly spined beneath.

Pyrrharctia isabella.

Phalæna isabella Smith, N. H. Lep. Ins. Ga. p. 131. Tab. 66. (1797).
Arctia isabella Harr., Cat. Ins. Mass. (Hitchcock's Rt.) p. 591. (1833).
Rt. Ins. Mass. p. 253. (1841). Third ed. fig. 170 *larva*. (1862).
Walk., Cat. Lep. B. M. III. p. 611. (1855).
Spilosoma isabella Clem., Proc. Acad. Nat. Sci. Phil. p. 531. (Nov. 1860).
Arctia isabella Morris, Synopsis Lep. N. Amer. Appendix, p. 340. (1860).
Spilosoma isabella Saunders, Synopsis Can. Arctiadæ, p. 16. (1863).

N. Y. (Edwards). Mass. (Sanborn, Shurtleff, Scudder). Maine (A. S. P. Jr.). C. W. (Saunders).

Pyrrharctia californica n. sp.

This species would at first sight be easily confounded with *P. isabella*, but the head is much larger, and the body much stouter generally. The costa is much more convex, apex not so much produced; outer margin a little concave beneath the apex. Three transverse lines very obsolete, not so much waved as in *P. isabella*. Primaries of a deeper yellow. Secondaries: costa much bent in its middle; slightly concave below the apex. Nervules and margin roseate, within pale yellow, but much darker than in *P. isabella*. Beneath a costo-apical spot is visible.

Length .85. Exp. wings 2 inches.

San Francisco, Cal. (Mus. Comp. Zoöl. A. Agassiz.)

PHRAGMATOBIA Stephens.

Phragmatobia rubricosa Saunders.
Arctia rubricosa Harr., Rt. Ins. Mass. p. 253. (1841).
Third edit. fig. 171. (1862).
Morris, Synopsis Lep. N. Amer. Appendix, p. 341. (1860).
Phragmatobia assimilans Walk., Cat. Lep. B. M. III. p. 630. (1855).
Clem., Proc. Acad. Nat. Sci. Phil. p. 536. (Nov. 1860).
Morris, Synopsis Lep. N. Amer. Appen. p. 346. (1860).
Saunders, Synopsis Can. Arctiadæ, p. 23. (1863).
Phragmatobia rubricosa Saunders, Synopsis Can. Arctiadæ, p. 24. (1863).

Mass. (Scudder, Mus. Comp. Zoöl., Mrs. Bridgham). Maine (C. O. Hunt).

Mr. Beedle of St. Catherines, has given a description of the larvæ and their interesting habits (Saunders' Synopsis, p. 24). Mr. Scudder has found the cocoon from which he raised the moth. It is loose and thin, composed of the hairs of the caterpillar for the most part, held together by silk, and though much paler than that of *P. isabella* is very much like it otherwise. It is .85 inch long and .55 inch broad.

? **Phragmatobia fuliginosa** Steph.
Phragmatobia fuliginosa Walk., Cat. Lep. B. M. III. p. 628. (1855).
Clem., Proc. Acad. Nat. Sci. Phil. p. 537. (Nov. 1860).
Phragmatobia rubricosa Saunders, Synopsis Can. Arctiadæ, p. 24. (1862).

"St. Martin's Falls, Hudson's Bay, Dr. Barnston" (Walk.)

? **Phragmatobia fuliginosa** Steph.
Arctia fuliginosa Boisd., Lep. Cal. (Ann. Ent. Soc. France) p. 49. (1852).

"California," (Boisd.)

Phragmatobia vagans Walk.
Arctia vagans Boisd., Lep. Cal. (Ann. Ent. Soc. France) p. 49. (1852).
Phragmatobia vagans Walk., Cat. Lep. B. M. III. p. 630. (1855).
Clem., Proc. Acad. Nat. Sci. Phil. p. 336. (Nov. 1860).
Morris, Synopsis Lep. N. Amer. Appen. p. 346. (1860).

"California," (Boisd.)

ANTARCTIA Hübn.

♂. Head very prominent, owing to the long frontal hairs, which form a conical horizontal tuft. Antennæ with long even pectinations. ♀ ? Palpi porrect, long and slender; the tips acute, projecting beyond the front. Thorax very pilose, remarkably stout, while the abdomen is short conical, rapidly tapering to the subacute tip. The scales of the prothorax are hardly distinguishable from those on the rest of the thorax.

Primaries a little more than one-half as broad as long, being short, broad and oblong. Costa straight, apex obtusely rectangular. Outer margin straight, suddenly bending around near the inner angle. Costal nervure long, terminating near the 1st and 2nd s. c. Origin of 4th very remote from 5th, arising near the outer margin. First three median nervules arise much beyond the middle of the wing; the 3rd being close to the 1st and 2nd.

Secondaries reach farther towards the tip of the abdomen than usual. Costa long and straight; apex rounded, a little produced; outer edge long, convex, not bent in the middle. The three m. nervules arise very near together, slightly angulated at their origins.

Legs somewhat slender, long, pilose. Body beneath very pilose.

Coloration uniform tawny, with no markings except discal dots and two transverse bands of black dots.

In form this genus closely resembles Lederer's genus *Ocnogyna* in the much produced prominent head, owing to the length of the frontal hairs; in the deeply pectinated large stout antennæ; the short broad wings and very stout wooly body and short abdomen. The costa of the primaries is remarkably straight; the outer edge straight, making the apex rectangular, but they differ from the above mentioned genus. The peculiar coloration is abnormal in this family. It was this, besides the stout wooly body and short broadly pectinated antennæ, that most probably led Hübner to place it near *Clisiocampa* in his "Verzeichniss."

Antarctia punctata n. sp.

Tawny brown. Pectinations of the antennæ and tips of the palpi darker. Two black dots near the base of the primaries; one costal, the other median. Two outer curved lines of black dots. Discal dot largest and most distinct beneath. Secondaries with discal dot; an interrupted submarginal row of dots consisting of two near the internal angle, one below the apex, the other situated upon it. Fore femora tinged with vermillion beneath. Another specimen has all the dots nearly obsolete.

Two males loaned me by Mr. Edwards vary as much as *Hyphantria cunea* in the obsolescence of the three rows of spots, since in one specimen they are nearly absent, while in another specimen they are all present. Both differ from the subjects of the above description in having entirely dark secondaries, while one has a still darker almost black brown submarginal band separated by a light brown abbreviated basal band from the inner dusky portion of the wing, and the other has the wing uniformly dusky to near the base of the fringe, while in both cases the discal dots are present, though obscure.

♂. Length .60. Exp. wings 1.55.

Mendocino City, Cal. (Mus. Comp. Zoöl. A. Agassiz). California (Edwards).

LEUCARCTIA* nov. gen.

Front thickly covered with short hairs. Antennæ well pectinated, the pectinations in the ♀ being as long as the joints of the antennæ themselves, which are annulated above with white and black. Clypeus short, somewhat sunken between the eyes; the sides nearly straight; front edge square, slightly notched at the foramina. Labrum short, obtusely rounded. Mandibles minute, discoverable by a few setæ. Maxillæ stout and well developed. Palpi depressed, hardly surpassing the front; 2-jointed, the joints of nearly equal length, the scales on the tip of the basal joint surpassing the tip of the 2nd.

Thorax and abdomen stouter than usual. The forewings are convex towards the unusually produced apex; outer margin very oblique, slightly convex. Secondaries: costa hardly bent in the middle; apex produced; outer margin nearly as long as the costa, and regularly convex, reaching a third of the way to the tip of the abdomen. Legs stout, short, femora pilose beneath. Two pairs of tibial spurs very approximate and unequal in size. The tip of the abdomen is conical in the ♂, very obtuse in the ♀.

While this genus is of much larger size and possesses quite a different style of coloration from *Spilosoma*, there are many important characters that warrant its separation from that genus. There are marked differences in the relative size and form of the clypeus, and also of the palpi. Though confounded with *Spilosoma*, by its narrower primaries, with their very oblique outer edge, it is much nearer to *Hyphantria*. and it should perhaps fall between the two genera.

Leucarctia Acræa.

——— *pseuderminea* Peck?

Phalaena acria Smith, N. H. Lep. Ins. Ga. p. 133. Tab. 67. (1797).

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* λευκός *white*, Arctia.

Estigmene acria Hübn., Samml. Exot. Schm. Bd. 2, pl. 191, no loc. (1806).
Verz. p. 184. (1816).
pseudermia Peck, Mass. Ag. Rep. and Journ.
Arctia pseuderminea Harr., Mass. Ag. Rep. and Journ. p. 322. Pl. 1. (1823).
Arctia acria Harr., Cat. Ins. Mass. (Hitchcock's Rt. p. 591). (1833).
Rt. Ins. Mass. p. 251. (1841). Third ed. Pl. 6, fig. 9 ♂, 10 ♀.
Fig. 169, *larva*.
Spilosoma acrea Westw., Ed. Drury.
Walk., Cat. Lep. B. M. III. p. 667. (1855).
Clem., Proc. Acad. Nat. Sci. Phil. p. 531. (Nov. 1860).
Morris, Synopsis Lep. N. Amer. Appendix, p. 342. (1860).

Leucarctia californica n. sp.

♀. White. Primaries with five distinct black costal dots, and a mesial, submarginal and marginal row of black dots, those on the outer margin the most distinct. Secondaries white; a discal dot, another one near the internal angle, and a marginal row of minute dots, obsolete on the internal angle. On the under side of the fore wings the costal dot, the apical half of the submarginal row and the marginal are present. All the dots appear on the under side of the secondaries. Fore coxæ yellow, black within. Abdomen deep buff yellow, with a dorsal and subventral row of black dots.

Length of body, .88. Exp. wings, 2.40 inches.

San Francisco, Cal. (Mus. Comp. Zoöl. A. Agassiz).

The single specimen described above was imperfect, wanting the head.

SPILOSOMA Stephens.

Spilosoma virginica Walker.
Bombyx virginica Fabr.
Arctia virginica Harr., Cat. Ins. Mass. (Hitchcock's Rt. p. 591). (1833).
Rt. Ins. Mass. p. 248. (1841). 3rd ed. fig. 168, 167, *larva*. (1862).
Spilosoma virginica Walk., Cat. Lep. B. M. III. p. 668. (1855).
Fitch, Third Rt. Ins. N. Y. (1856).
Clem., Proc. Acad. Nat. Sci. Phil. p. 531. (Nov. 1860).
Morris, Synopsis Lep. N. Amer. Appendix, p. 342. (1860).
Saunders, Synopsis Can. Lep. p. 14. (1863).

Desideratum.

Spilosoma congrua Walk., Cat. Lep. B. M. p. 669.
"Georgia."

Spilosoma vestalis n. sp.

♀. Pure white. Antennæ, thorax and wings white. Palpi brown. A minute brown dot near the base of the median, and a similar one the origin of the fourth median, and one on each side of the origin of the 2nd m. There are two indistinct rows of minute and remote dots parallel with the margin of the wing. A discal dot on the secondaries. and a somewhat larger spot near the inner angle. These reappear beneath. Two costal dots on the primaries beneath with a linear discal dot. Beneath the two outer rows of dots are obsolete. Fore coxæ and femora vermillion beneath; tibiæ and tarsi brown beneath. Abdomen broadly annulated above with brown, and a subventral row of large brown spots.

Length of body, .82. Exp. wings, 2.05.

San Francisco, Cal. (Mus. Comp. Zoöl. A. Agassiz).

HYPHANTRIA Harris.

Hyphantria textor Harr.

Hyphantria textor Harr., Rt. Ins. Mass. p. 255. (1841).
Arctia textor Harr., Cat. Ins. Mass. (Hitchcock's Rt. p. 591.) (1833).
Hyphantria textor Fitch, Third Rt. Ins. N. Y. p. 382. (1856).
Eupractis textor Walk., Cat. Lep. B. M. p. . ( ).
Hyphantria textor Clem., Proc. Acad. Nat. Sci. p. 530. (Nov. 1860).
Spilosoma textor Clem., Appen. to Morris, Synop. Lep. N. Amer. p. 344. (1860).

N. Y. (Edwards). Mass. (Shurtleff, Sanborn. Harr. Col.) Maine (A. S. P., Jr.).

Hyphantria punctata Fitch.

Hyphantria punctata Fitch, Third Rt. Ins. N. Y. p. 387. (1856).
Spilosoma punctata Clem., Appendix to Morris, Synopsis Lep. N. Amer. p. 344. (1860).

Hyphantria cunea Fitch.

Bombyx cunea Drury, Illustr. Nat. Hist. i. p. 36. Pl. 18, fig. 4. (1770).
Phalæna punctatissima Smith, N. H. Lep. Ins. Ga. p. 139. Tab. 77. (1797).
Cycma cunca Hübn., Verz. p. 184. (1816). Zutr. Dritt. Hund. p. 8, fig. 405, 406. (1825).
Spilosoma cunea Westw., Ed. Drury, p. 34. (1837).
Hyphantria punctatissima Harr., Rt. Ins. Mass. p. 255. (1841).
cunea Fitch, Third Rt. Ins. N. Y. p. 384. (1856).
Spilosoma cunea Walk., Cat. Lep. B. M. III. p. 669. (1855).
Hyphantria cunea Clem., Proc. Acad. Nat. Sci. p. 531. (Nov. 1860).
Appendix to Morris, Synopsis Lep. N. Amer. p. 343. (1860).

N. Y. (Edwards). Mass. (Harr. Coll.).

ARACHNIS Hübner.

Arachnis picta n. sp.

♀ Head bicolorous; front below the base of antennæ pale slate. above white. Base and tip of palpi vermillion, scales beneath white.

Prothorax white, each half with a large round pale slate central spot margined with black. Notum pale slate; patagia margined with black, and a double median black line.

Primaries pale slate with five very unequal sigmoid dislocated white bands, broadest upon the costa, and margined with black. Third and fourth consist, below the costa, of disconnected dots, and the 5th is entirely dislocated on the 5th s. c. Secondaries and abdomen pale vermillion. The former with three transverse dusky bands of which the inner is the broadest; the outer consists of four disconnected spots, and the outer margin is lined with dusky cinereous. Primaries beneath with four costal yellow spots, of which the second is much the largest. There are two smaller triangular ones on the internal margin, obscurely connected with the costal one by a dark obscure line, the marginal white line is the same as in the upper surface.

Secondaries: costal half of base yellow, with two costal yellow spots, of which the outer is much the smaller; the internal half of the base of the wing is pale vermillion, and the wing below the median nervure is slightly tinged with vermillion. Transverse incomplete lines, as on the upper side.

Legs: femora beneath vermillion, femoral joint and tips of tibiæ and tarsi slate and whitish, ringed with black. Abdomen above vermillion, with a dorsal median broad dusky line and a lateral row of small approximate black dots, bounding the pruinose ventral side.

Length .65. Exp. wings 1.62 inches.

San Francisco, Cal. (Mus. Comp. Zoöl. A. Agassiz).

ECPANTHERIA Hübner.

Ecpantheria scribonia Hübn.

Phalæna scribonia Stoll, Suppl. Cramer. Pap. Exot. p. 177. Pl. 41, fig. 3. (1787).
oculatissima Smith, N. H. Lep. Ins. Ga. p. 137. Tab. 69. (1797).
Ecpantheria scribonia Hübn., Verz. p. 183. (1816).
Walk., Cat. Lep. B. M. III. p. 689. (1855).
Clem., Proc. Acad. Nat. Sci. Phil. p. 523. (Nov. 1860).
Morris, Synopsis Lep. N. Amer. Appen., p. 347. (1860).
Saunders, *Larva.* (Descr. and habits.) Proc. Ent. Soc. Phil. ii. p. 28. (1863). *Imago,* Synopsis Can. Arctiadæ, p. 22. (1863).

Larva, London, Can. W. (Saunders). St. Catharines (Coll. Scudder). N. York (Grote). Va., Larva. M. C. Z. (Lyman). Beaufort, N. C. (Shute).

HALESIDOTA Hübner.

Halesidota tessellaris Hübner.
Phalæna tessellaris Smith, N. H. Lep. Ins. Georgia, p. 149. (1797).
Halesidota tessellaris Hübn., Verz. p. 170. (1816).
Arctia tessellaris Harr., Cat. Ins. Mass. (Hitchcock's Rt. p. 592.) (1833).
Halesidota tessellaris Hübn., Geyer's Forts., Hübn., Zutr., Dritt., Hund. p. 34, fig. 939–'40. (1837).
Lophocampa tessellaris Harr., Rt. Ins. Mass. p. 260. (1841).
Halesidota tessellaris Walk., Cat. Lep. B. M. v. p. 732. (1855).
Clem., Proc. Acad. Nat. Sci. Phil. p. 534. (Nov. 1860).
Morris, Synopsis Lep. N. Amer. Appendix, p. 348. (1860).
Saunders, Synopsis Can. Arctiadæ, p. 19. (1863).

Mass. (Shurtleff, Sanborn). Maine, at night, August (A. S. P., Jr.).

Halesidota antiphola Walsh, Proc. Bost. Soc. N. H. ix. p. 288. (Feb. 1864).

"Illinois." (Walsh.)

Halesidota caryæ Clemens.
Lophocampa caryæ Harr., Rt. Ins. Mass. p. 258. (1841).
Fitch, First Rt. Ins. N. Y. p. 159, fig. *larva*, *pupa* and *cocoon*. (1855).
Halesidota annulifascia Walk., Cat. Lep. B. M. v. p. 734. (1855).
Phegoptera porphyria H.-Sch., Lep. Exot. Sp. Nov. fig. 283. (1855).
Halesidota porphyria H.-Sch., " " " p. 71. (1858).
caryæ Clem., Proc. Acad. Nat. Sci. Phil. p. 533. (Nov. 1860).
annulifascia Clem., Proc. Acad. Nat. Sci. Phil. p. 533. (Nov. 1860).
caryæ Morris, Synopsis Lep. N. Amer. Appendix, p. 349. (1860).
annulifascia Morris, " " " " " (1860).
caryæ Saunders, Synopsis Can. Arctiadæ, p. 20. (1863).

Mass. (Sanborn, Shurtleff). Maine (A. S. P., Jr.).

Halesidota maculata Clemens.
Lophocampa maculata Harr., Rt. Ins. Mass. p. 259. (1841).
Halesidota fulvoflava Walk., Cat. Lep. B. M. v. p. 733. (1855).
Phegoptera guttifera H.-Sch., Lep. Exot. Sp. Nov. fig. 284. (1855).
Halesidota fulvoflava H.-Sch., Lep. Exot. Sp. Nov. p. 71. (1858).
Clem., Proc. Acad. Nat. Sci. Phil. p. 534. (Nov. 1860).
Morris, Synopsis Lep. N. Amer. Append. p. 349. (1860).
maculata Clem., Loc. cit. (Nov. 1860).
Morris, Loc. cit. (1860).
fulvoflava Saunders, Synopsis Can. Arctiadæ, p. 21. (1863).

Mass. (Harris' Coll.). Maine (Mus. Comp. Zoöl. Smith, Verrill).

Halesidota Agassizii n. sp.

♂. Pale lemon yellow. Base of patagia reddish brown. Primaries with three oblique indistinct reddish brown bands of which the basal one is curved, while the two outer ones are straight. The second one subdivides just below the fourth median. A triangular discal spot. A submarginal row of rust brown dots on the apical half of the wings. Secondaries much paler, concolorous with both wings beneath. On the primaries the discal and an outer additional dot appear beneath.

Length of body, .68. Exp. wings, 1.65 inches.

San Francisco, Cal. (Mus. Comp. Zoöl. A. Agassiz).

Halesidota Edwardsii n. sp.

♂. Bicolorous, buff-yellow and vermillion. Primaries with five subhyaline smoky transverse bands, margined with black, less oblique than usual. The basal band consists of a small costal spot and an outer median large round spot. Second band regularly curved, third hardly oblique, waved. Two outer ones nearly parallel with the outer margin.

Secondaries transparent except on the pilose inner margin, which is tinged with vermillion. Abdomen above, including the base of the anal tuft, vermillion.

Beneath pale buff, the costal spots reappear. On the costa of the secondaries near the apex are two dusky square spots, which do not appear on the upper side.

Legs annulated on the femora and tibiæ. One ring on the end of tibiæ, and each tarsus is annulated on the basal half with smoky pale brown. Femora vermillion beneath.

Length of body, .80. Exp. wings, 2.20 inches.

San Francisco, Cal. (Edwards.)

Halesidota argentata n. sp.

♀. Head and thorax pale buff yellow. Base and side of the front walnut brown. Centre of prothoracic pieces brown. Patagia margined with brown, within very broadly so.

Primaries walnut brown, with five rows of large irregular round or ovate silver white spots, except the costal spots, which are buff yellow. Two basal spots yellow. Internal margin buff as far as the first line, which is slightly curved, the middle dot of which last is much smaller than the others. In the second line, which is straight, the submedian spot is transversely broad, oblong. Costal spot largest. The third row does not extend to the inner margin. The spots making up the marginal and last row are uniformly round. Fringe and termination of nervules pale buff.

Secondaries white. Middle of the costa and apex and discal dot brown. Beneath much as above, a little paler. Legs buff, base of femora and tips of tibiæ and tarsi broadly annulated with brown. Abdomen buff above, beneath brown.

Length of body, .85. Exp. wings, 2.05.

Gulf of Georgia, Cal. (Mus. Comp. Zoöl. A. Agassiz).

EUCHÆTES Harris.

Euchætes Egle Harris.

Bombyx Egle Drury, Illustr. Nat. Hist. ii. p. 36. Pl. 20, fig. 3. (1773).
Spilosoma Egle Westw., Ed. Drury. (1837).
Euchætes Egle Harr., Rt. Ins. Mass. p. 257. (1841).
Third ed. fig. 172 *larva*, 173 *cocoon*, 174 *pupa*. (1862).
Spilosoma Egle Walk., Cat. Lep. B. M. III. p. 669. (1855).
Euchætes Egle Clem., Proc. Acad. Nat. Sci. Phil. p. 532. (Nov. 1860).
Spilosoma Egle Morris, Synopsis Lep. N. Amer. p. 343. (1860).

Brookline, Mass., (Shurtleff, Harris' Coll.) Norway, Me., (Mus. Comp. Zoöl. Smith.) London, C. W., (Saunders.)

From the same brood of larvæ, Mr. Shurtleff has raised both the typical forms, and a white variety which agrees well with Dr. Fitch's description of *Hyphantria collaris*. I have since received this albino from Mr. Saunders, of London, C. W., labelled *H. collaris*.

Euchætes eglenensis Clem.

Var? *Euchætes eglenensis* Clem., Proc. Acad. Nat. Sci. Phil. p. 533. (Nov. 1860).

Descriptions of North American HYMENOPTERA, in the Collection of the Entomological Society of Philadelphia.

BY E. T. CRESSON.

Fam. EVANIIDÆ.

Genus FŒNUS, Fabr.

1. **F. occidentalis**, n. sp.

Black, thorax rugose, third and fourth segments of the abdomen ferruginous, ovipositor long, valves tipped with white.

Female.—Head black, somewhat shining; face and cheeks slightly silvery-sericeous; antennæ black, tinged with piceous beneath. Thorax black, opaque, rather roughly and confluently punctured, mesothorax transversely rugose, especially on the sides; metathorax scabrous. Wings hyaline, nervures and stigma black. Legs black, the anterior pair and the intermediate tibiæ at base tinged with piceous; the anterior tibiæ at base whitish, the posterior tibiæ and their tarsi within near their base with a pale spot. Abdomen long and slender, black; the second, third and fourth segments ferruginous; ovipositor longer than the body, ferruginous, valves black, tipped with white. Length 7 lines;* expanse of wings 8 lines.

Variety ♀.—Has the base of the intermediate tibiæ white and the basal joint of the posterior tarsi with a broad white annulus; the sides of the fifth segment of the abdomen are tinged with ferruginous.

Hab.—Rocky Mountains, Colorado Territory. Two specimens. From the Committee on Collecting Fund, (as well as all other species described in this paper from this locality).

Seems to be closely allied to *F. jaculator* Linn., of Europe, which I have not seen. The mandibles have each a very strong, acute, basal, rufous tooth within, as has been observed in *jaculator* and several other species.

2. **F. perplexus**, n. sp.

Black; thorax punctured, not rugose; second, third and fourth segments of abdomen ferruginous; ovipositor long, valves tipped with white.

Female.—Black. Head somewhat shining; antennæ slightly piceous beneath towards the tip. Thorax opaque; mesothorax sprinkled

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* In giving the length of the species described in these papers, the ovipositor is not included.

rather sparsely with distinct punctures, which are confluent in front of the scutellum; metathorax roughly punctured. Wings hyaline, nervures black. Legs black, all the tibiæ at base with an obscure whitish spot, indistinct on the posterior pair. Abdomen long and slender, black, the second, third and fourth segments ferruginous, the fourth partly blackish; ovipositor longer than the body, ferruginous, valves black, their tips white. Length 5—6 lines; expanse of wings 6—7 lines.

Hab.—Rocky Mountains, Colorado Territory. Four ♀ specimens.

Closely resembles the preceding species, but is smaller, the thorax above has the punctures distinct and somewhat sparse, while *occidentalis* has the punctures rough and confluent, and the sides of the mesothorax transversely rugose; otherwise the two species agree.

3. **F. montanus**, n. sp.

Black, half of the second, the third and part of the fourth segment of the abdomen rufous; ovipositor very short.

Female.—Black; tip of the antennæ beneath testaceous; thorax without punctures, minutely shagreened; metathorax roughly punctured. Wings slightly tinged with fuliginous; nervures and stigma black. Legs black; anterior femora at base, apex of all their tibiæ within and all the tarsi more or less tinged with pale rufous; posterior femora beneath with a rufous stripe near the tip. Abdomen black, the apical half of the second, the whole of the third and a part of the fourth segments rufous; ovipositor very short, about 2 lines in length, pale rufous, valves black. Length 5 lines; expanse of wings 6 lines.

Hab.—Rocky Mountains, Colorado Territory.

Distinct from all other species known to me, by its shorter and much more robust form; the abdomen is not so much compressed and the segments are shorter in proportion to the length of the abdomen, than in the other species.

4. **F. tarsatorius**, Say.

Fœnus tarsatorius Say, Long's Second Expedition, ii, p. 321.

This species seems to be closely allied to *F. Barnstonii* Westw., from Hudson's Bay, and having before me ten ♀ specimens of Say's species, it would perhaps be useful to give here a more detailed description of it, which may serve to draw more closely the dividing line between the two species. I have not seen any males of this species.

Female.—Black, subopaque; face, cheeks and the thorax have a more or less distinct silvery-sericeous appearance in certain lights; mandibles, except base and apex, yellowish-ferruginous; antennæ blackish-piceous above and rufo-piceous beneath, sometimes the basal joint beneath is rufous, and the joints towards the tip are also sometimes rufous; neck long; thorax roughly and confluently punctured, somewhat transversely rugose above; tegulæ and tubercles mostly pale rufous, sometimes piceous; wings hyaline and beautifully iridescent; the two anterior pairs of legs are pale rufous, base and tips of their tibiæ, and the base of their tarsi whitish, their femora sometimes obfuscated; the anterior and intermediate coxæ are piceous, the anterior pair sometimes rufous, posterior pair always black and rugose; posterior legs black, their trochanters rufous, their tibiæ and tarsi near the base white, the latter sometimes reduced to a dot or subobsolete; abdomen long and slender, tip of the second and third segments on each side broadly rufous, sometimes the tip of the fourth segment is obscurely so; in two specimens the rufous coloring is indistinct on the second and third segments; ovipositor about as long as the body, fulvous, valves black, tipped with white.

Hab.—Massachusetts. Mr. James Ridings.

5. **F. incertus**, n. sp.

Black; second, third and fourth segments of the abdomen each with a ferruginous spot on each side at base; ovipositor very short.

Female.—Black; antennæ slightly tinged with piceous beneath towards the tip. Thorax dull black, without distinct punctures, minutely shagreened; metathorax roughly punctured. Wings obscure hyaline, nervures and stigma black. Legs black, the two anterior pairs with the base of their tibiæ reddish. Abdomen black, apex much broader than usual; sides of the second, third and fourth segments at tip, ferruginous; ovipositor very short, about one line in length, ferruginous, valves black. Length 4½ lines; expanse of wings 5 lines.

Male.—Resembles the female, but the abdomen is more slender, all the tarsi, the two anterior pairs of femora and the posterior femora at base, more or less pale ferruginous.

Hab.—Rocky Mountains, Colorado Territory.

This appears to agree very well with the description of *F. assectator* Linn., of Europe, with the exception of the coloring of the legs.

Genus **AULACUS**, Jurine.

1. **A. rufitarsis**, n. sp.

Black; abdomen and tarsi rufous.

Female.—Head black; cheeks, vertex, occiput and mandibles polished; face subopaque, slightly pubescent; antennæ longer than the head and thorax, black. Thorax black, gibbous, deeply and transversely wrinkled above, the furrows apparently impunctured; scutellum more finely wrinkled and having two short longitudinal impressions, close together, on the disk; metathorax rugose. Wings hyaline costa fuliginous, nervures and stigma black, the second transverse nervure almost entirely obliterated. Legs black; femora polished; coxæ rugose; posterior tibiæ flattened and having a few large confluent punctures exteriorly; tarsi rufous, their claws black, sometimes the anterior tarsi are blackish, and in one specimen the two anterior pairs of legs are rufo-piceous. Abdomen bright rufous, polished, impunctured, extreme base black; ovipositor rather longer than the body, yellowish, valves black. Length 5 lines; expanse of wings 8 lines.

Hab.—Rocky Mountains, Colorado Territory.

2. **A. stigmaterus**, n. sp.

Black; the first and second abdominal segments rufous; legs in most part pale fulvous.

Female.—Head black, cheeks, vertex, occiput and mandibles polished, the face slightly pubescent; the anterior margin of the clypeus and a large spot on the mandibles, pale testaceous; antennæ longer than head and thorax, black, reddish at tip. Thorax black, gibbous, rather deeply and transversely wrinkled above, the furrows apparently impunctured; pleura not so coarsely rugose; metathorax coarsely rugose. Wings hyaline, nervures and stigma fuscous; the extreme apex and a subtriangular mark extending from the stigma to the radial nervure at the junction between the marginal and the first submarginal cells, fuscous; posterior half of the second transverse nervure obliterated. Legs pale fulvous, the tarsi paler, all the coxæ and trochanters and the posterior femora except extreme base and apex black, the posterior tibiæ slightly obfuscated. Abdomen black, polished, impunctured; the peduncle and the third and following segments black, the first and second segments being bright rufous; ovipositor rather longer than the body, fulvous, valves black. Length 5 lines; expanse of wings 8 lines.

Hab.—New Jersey. E. T. Cresson.

Seems to be closely allied to *A. Abbottii* Westw., but is much smaller and somewhat differently colored.

Fam. ICHNEUMONIDÆ.

Gen. **ICHNEUMON**, Linn.

BLACK SPECIES.

Section 1.—Scutellum and abdomen black....................Sp. 1—13
" 2.—Scutellum white, abdomen black....................Sp. 14—22
" 3, *a.* Scutellum pale, or with pale markings; abdomen black, terminal segment more or less white....................Sp. 23—24
" *b.* Scutellum ditto; abdomen black, tip of first segment more or less white....................Sp. 25—27
" *c.* Scutellum ditto; abdomen black, apex fulvous....................Sp. —28

YELLOW, RED AND BLACK SPECIES.

" 4.—Scutellum ditto; abdomen tricolored—black, red & white or yellow....................Sp. 29—31

YELLOW AND BLACK SPECIES.

" 5.—Scutellum pale; abdomen black, with the apex and in general the middle also, banded or spotted with yellow or white....................Sp. 32—34
" 6.—Scutellum pale; abdomen black, banded with yellow, the apex always black....................Sp. 35—38

RED AND BLACK SPECIES.

" 7. *a.* Scutellum pale; thorax black; abdomen red or red and black....................Sp. 39—46
b. Scutellum yellow, yellowish-red, or red; thorax more or less red; abdomen red or red and black....................Sp. 47—63
" 8.—Scutellum black, abdomen red or red and black....................Sp. 64—73
" 9.—Scutellum yellow; abdomen red or red and black, apex white....................Sp. 74—75

SECTION 1.

1. **Ich. Maurus**, n. sp.

Black; antennæ with a broad white annulus; wings dark fuscous; central area of metathorax rotundate, moderate.

Female.—Black, opaque; head with very narrow pale orbits above the antennæ; clypeus polished, with a rounded impression on each side; antennæ about half the length of the body, black, the 9th to 17th joints white above, spotted beneath with black, apical half involute, flattened toward the tip and brownish-sericeous beneath. Thorax closely punctured; scutellum flat, polished, with a few scattered punctures;

metathorax scabrous, opaque, the elevated lines sharply defined, the central area moderate, rotundate. Wings dark fuscous, with a rather strong violaceous reflection; nervures and stigma black; areolet 5-angular or subtriangular. Legs black, anterior tibiæ pale in front. Abdomen elongate-subovate, opaque black, slightly tinged with blue. densely and minutely punctured; the first segment broad, bilineated; basal foveæ of the second segment deep and transverse; apical segments more smooth and somewhat shining; ovipositor not exserted. Length 9 lines; expanse of wings 16 lines.

Hab.—Virginia. Dr. Thos. B. Wilson.

2. **Ich. Orpheus**, n. sp.

Black; antennæ with a broad white annulus; wings fuscous, clearer at base; central area of metathorax large, quadrate, transverse.

Female.—Black; the head with the frontal orbits above the antennæ, interrupted at the summit of the eyes, white; antennæ more than half the length of the body, black, with the 10th to 18th joints pure white above, apex slightly involute. Thorax closely punctured, somewhat shining; mesothorax in front with an impressed line on each side; a short line beneath the wings and sometimes one in front, white; scutellum slightly convex, deeply impressed in front; metathorax closely and confluently punctured, the elevated lines not well defined, the central area large, quadrate, somewhat transverse, rather smooth and shining. Wings fuscous, clearer at base, slightly violaceous; nervures and stigma black, the latter with a pale spot at base; areolet 5-angular or subtriangular, slightly oblique. Legs black, tips of the anterior femora and their tibiæ on the inner side, whitish. Abdomen blue-black, subopaque, densely and finely punctured, basal segment broad, finely aciculate and bilineated; basal foveæ of the second segment deep and transverse; apical segments almost smooth, shining; ovipositor not exserted. Length 9 lines; expanse of wings 15½ lines.

Hab.—Pennsylvania. E. T. Cresson.

Closely resembles *Ich. Maurus*, but differs by the head being broader, the metathorax much smoother and shining, the quadrate central area, the clearer wings, and the stronger punctation of the abdomen, the apex of which is smooth and shining.

3. **Ich. Viola**, n. sp.

Black; antennæ with a broad white annulus; wings deep violaceous; central area of a metathorax somewhat conical, small.

Female.—Black, shining, closely punctured; head with narrow whitish orbits; clypeus polished, with a rounded, well impressed fovea on each side; antennæ rather short, black, the 10th to 18th joints white above, the apical half involute, flattened toward the tip and brownish-sericeous beneath. Thorax with a longitudinal, slightly impressed line on each side anteriorly; scutellum slightly convex, polished; metathorax deeply and confluently punctured, clothed with a short pale pubescence, the elevated lines well defined, the central area small and somewhat conical, almost smooth and rather indistinct. Wings dark fuscous, with a deep violaceous reflection, nervures and stigma black, areolet 5-angular or subtriangular, slightly oblique. Legs black, the anterior tarsi in front whitish. Abdomen black, with a faint tinge of blue, shining, minutely punctured; first segment broad, punctured; basal foveæ of the second segment deep, transverse, and somewhat oblique; apical segments smooth and polished; ovipositor not exserted. Length 8 lines; expanse of wings 14 lines.

Hab.—Pennsylvania. E. T. Cresson.

This fine species closely resembles *Ich. Orpheus*, but is distinguished at once by the different sculpture of the metathorax and the deep violaceous wings.

4. **Ich. saucius**, n. sp.

Black; antennæ with a broad white annulus; wings fuscous; central area of metathorax large, rounded in front and indented behind.

Female.—Black, shining, closely punctured; clypeus with large punctures and a large rounded fovea on each side; antennæ short, slightly involute at tip, the 9th to 17th joints white above and beneath, beyond this annulus the joints are rufous beneath. Scutellum flat, polished, with a few scattered punctures; metathorax strongly and somewhat confluently punctured, the elevated lines tolerably well defined, the central area large, slightly elongate, rounded in front and deeply indented behind. Wings fuscous, marginal cell darker; nervures and stigma black; areolet 5-angular. Legs black, shining, the anterior tibiæ and tarsi in front piceous. Abdomen elongate, densely punctured, subopaque, smooth and shining towards the apex; basal segment finely aciculate, bilineated; basal foveæ of the second segment small; ovipositor not exserted. Length 7 lines; expanse of wings 12 lines.

Hab.—Pennsylvania. E. T. Cresson.

Allied in form and color to the preceding species, but is smaller, the antennæ much shorter, and the sculpturing of the metathorax is very different.

5. **Ich. Afer**, n. sp.

Black; antennæ with a yellowish-white annulus; wings subhyaline; central area of metathorax large and quadrate.

Female.—Deep black, shining, closely and finely punctured; antennæ two-thirds as long as the body, porrect, the 11th to 16th joints yellowish-white, basal joint robust; middle of the face just beneath the antennæ prominent. Scutellum slightly convex; metathorax finely scabrous, the elevated lines distinct, the central area large, quadrate, slightly transverse. Wings subhyaline, tinged with fuliginous and having a slight violaceous reflection; nervures and stigma blackish; areolet 5-angular or subtriangular. Legs black, the anterior tibiæ and all the tarsi at tips piceous. Abdomen robust, shining, finely punctured; petiole slender; the first segment broad, finely aciculate; basal foveæ of the second segment indistinctly impressed; ovipositor not exserted. Length 5½ lines; expanse of wings 9 lines.

Hab.—Illinois. Dr. Samuel Lewis.

Closely allied to *Ich. malacus* Say, but is smaller and with clearer wings. I have before me 14 specimens of *malacus*, all of which have the central area of the metathorax large and quadrate, and the wings dark fuscous with a rather strong violaceous reflection. Length 6½—7½ lines; expanse of wings 12—13 lines.

6. **Ich. ater**, n. sp.

Black; antennæ with a white annulus; wings subhyaline; central area of metathorax large, subquadrate.

Female.—Black, subopaque; head with narrow white frontal orbits not reaching the clypeus which is shining and having a rather deep rounded fovea on each side; antennæ short, flattened towards the tip and slightly involute, the 8th and 14th joints white. Thorax finely punctured, subopaque; a minute white spot on each side in front of the tegulæ; scutellum flat, triangular, polished, distinctly punctured; metathorax finely scabrous, the elevated lines tolerably well defined and shining, the central area large, subquadrate, rather smooth. Wings subhyaline, faintly tinged with fuliginous; nervures blackish, stigma piceous; areolet 5-angular, almost triangular. Legs black, the anterior tibiæ in front pale. Abdomen elongate, subopaque, very finely and densely punctured; first segment rather broad, bilineated and finely aciculate; basal foveæ of the second segment deep, transverse and somewhat oblique; apical segments smoother and shining; ovipositor not exserted. Length 7 lines; expanse of wings 11 lines.

Hab.—New York (Mr. James Angus); Illinois (Dr. Saml. Lewis).

7. **Ich. cincticornis,** n. sp.

Black; antennæ with a broad white annulus; wings fuliginous; central area of metathorax large, quadrate.

Female.—Black, closely punctured; antennæ more than half the length of the body, black, the 9th to 17th joints white above and beneath. Thorax opaque, scutellum convex, strongly punctured; metathorax confluently punctured, the elevated lines sharply defined, the central area large, quadrate. Wings tinged with fuliginous; nervures and stigma blackish; areolet 5-angular. Legs black, the anterior tibiæ in front yellowish. Abdomen elongate, rather slender, subopaque, densely and finely punctured, apical segments smooth and shining; the basal foveæ of the second segment deep and oblique; ovipositor yellow, exserted about one line. Length 6½ lines; expanse of wings 10 lines.

Hab.—Pennsylvania. Mr. Chas. A. Blake.

Resembles *Ich. ater*, but the antennæ are longer and more slender, and the white annulus broader; the head is entirely black, the central area larger and quadrate and the areolet of the superior wings is 5-angular and not subtriangular.

8. **Ich. Blakei,** n. sp.

Black; antennæ with a broad white annulus; wings blackish-fuscous; central area of metathorax obsolete.

Male.—Head black, the clypeus and mandibles shining, clothed with short black pubescence; palpi black; antennæ porrect, three-fourths the length of the body, black, the 8th to 18th joints pure white, the 8th and 15th to 18th joints spotted beneath with black. Thorax black, closely punctured; mesothorax in front with a deeply impressed longitudinal line on each side, between which there is a longitudinal carina more distinct on the extreme front; scutellum convex, black, very deeply impressed in front and connected with the mesothorax on each side by a sharp carina; metathorax scabrous, opaque black, the elevated lines broken and indistinct, the central area obsolete, the lateral tubercles prominent. Wings ample, blackish-fuscous, with a slight violaceous gloss; areolet 5-angular, the exterior nervure of which has a small hyaline spot on its middle, the cubital nervure and the second recurrent nervure, near the areolet, have also a small hyaline spot. Legs black, shining, the anterior femora with a whitish spot at tip and their tibiæ a whitish line on the inner side. Abdomen elongate, slender, black with a slight tinge of blue; the basal segment elongate, with two well defined carinæ extending from the angle forward on the petiole, on each side of the angulation a minute tubercle; the first and second segments roughly punctured, the latter having the basal foveæ transverse and rather deep; the fourth and following segments polished; venter black, shining. Length 9 lines; expanse of wings 15½ lines.

Hab.—Rocky Mountains, Colorado Territory.

I dedicate this very distinct and elegant species to my friend Mr. Charles A. Blake of Philadelphia.

9. **Ich. flavicornis,** n. sp.

Black, opaque; antennæ orange-yellow; wings dark fuscous, with a strong æneous reflection; central area of metathorax large, subquadrate, transverse.

Male.—Opaque deep black; head with the frontal orbits yellow, sometimes subobsolete or wanting; antennæ two-thirds the length of the body, orange-yellow, with the extreme base and apex blackish, scape deep black. Thorax closely punctured, with a rather deep indentation on each side of the mesothorax in front; scutellum convex, punctured, somewhat shining, deeply impressed in front and connected to the mesothorax on each side by a sharply defined carina, metathorax scabrous, the elevated lines tolerably well defined, the central area rather large and transverse. Wings dark fuscous, with a strong æneous reflection; nervures and stigma black; areolet 5-angular or subtriangular. Legs black, the anterior pair tinged with pale rufous on the inner side. Abdomen elongate, opaque black, immaculate, densely and finely punctured; basal segment finely aciculate, bilineated; basal foveæ of the second segment rather large and deep, more coarsely aciculate; beneath black. Length 9 lines; expanse of wings 15½ lines.

Hab.—New York. Mr. James Angus.

10. **Ich. montanus**, n. sp.

Blue-black; wings fusco-hyaline; central area of metathorax large, quadrate, transverse.

Male.—Entirely blue-black; the head and thorax having a slight tinge of green, rather densely punctured; antennæ almost as long as the body, black, opaque. Scutellum convex, deeply impressed in front and connected with the mesothorax on each side by a sharp carina; metathorax densely and confluently punctured, the elevated lines well defined, the central area large, quadrate, transverse. Wings fusco-hyaline, darkest on the apical margin and having a slight violaceous reflection; nervures black; areolet 5-angular. Legs blue-black, the inner side of the anterior tibiæ and tarsi and a spot at the tips of the anterior femora, whitish. Abdomen elongate, rather slender, densely punctured; basal segment somewhat shining, deeply tinged with blue, bilineated and finely aciculate; apical segments smoother. Length 7 lines; expanse of wings 11½ lines.

Female.—Resembles the male, except that the color is more bluish, the antennæ are shorter and the 11th to 14th joints above are white; the ovipositor is yellowish and exserted about one line.

Hab.—Rocky Mountains, Colorado Territory. 3 ♂ and 2 ♀ specimens.

11. **Ich. pedalis**, n. sp.

Black; wings fusco-hyaline; legs fulvous; central area of metathorax transverse.

Male.—Black, densely punctured; antennæ brown-black, more than half the length of the body. Thorax shining; scutellum rather convex, punctured shining; metathorax scabrous, opaque, the elevated lines well defined, the central area rather large, transverse, the posterior margin bent inwards. Wings fusco-hyaline, with a slight violaceous reflection; nervures and stigma black; areolet 5-angular or subtriangular. Legs fulvous, their coxæ, trochanters and the extreme tips of the posterior tibiæ, black. Abdomen opaque, densely punctured; basal foveæ of the second segment deep and oblique. Length 6½ lines; expanse of wings 11½ lines.

Hab.—Rocky Mountains, Colorado Territory.

12. **Ich. Ormenus**, n. sp.

Black, shining; wings subhyaline; legs fulvous; central area of metathorax large, elongate-subquadrate.

Female.—Black, closely punctured, clypeus shining, with a deeply impressed point on each side, mandibles and palpi piceous; antennæ short, involute, fusco-sericeous. Thorax somewhat shining, finely punctured; tegulæ rufo-testaceous; scutellum flat, smooth and polished; metathorax densely and somewhat roughly punctured, the elevated lines well defined, the central area large, elongate-subquadrate. Wings subhyaline, faintly stained with fuscous; nervures fuscous, testaceous at base, stigma fulvous; areolet 5-angular. Legs fulvous, the coxæ, the posterior femora at tip and their tarsi black. Abdomen elongate, rather slender, densely and finely punctured, the apical segments smooth and shining; the first segment bilineated, finely aciculate; basal foveæ of the second segment deep; beneath black; ovipositor not exserted. Length 6½ lines; expanse of wings 11½ lines.

Hab.—Pennsylvania. E. T. Cresson.

13. Ich. semilævis, n. sp.

Black; antennæ with a narrow white annulus; wings subhyaline; femora fulvous; central area of metathorax quadrate.

Female.—Black; head shining, closely punctured; face short, a rounded carina beneath the insertion of the antennæ; narrow orbits above the antennæ and a spot at the summit of the eyes, white; clypeus with a few large punctures, its anterior margin and the mandibles toward their tips, rufo-piceous; antennæ short, involute, the joints submoniliform, black, the 10th to 16th joints white above, beneath towards the tip they are brown-sericeous and flattened, basal joint robust, shining black. Thorax polished, sparsely punctured, the disk above as well as the scutellum almost destitute of punctures, being very smooth and shining; scutellum flat; metathorax densely and rather roughly punctured, the elevated lines tolerably well defined, the central area quadrate, not very distinct. Wings almost hyaline, faintly stained with fuliginous, nervures and stigma black; areolet 5-angular. Legs black, shining; all the femora and the anterior and intermediate tibiæ and tarsi rufous, the latter obfuscated at tips. Abdomen black, tinged with purple, polished towards the tip; petiole short; the 1st segment bilineated, finely aciculate; basal foveæ of the second segment deep and oblique, between these foveæ the surface is longitudinally rugose, the rugosity extending down the middle of the segment almost to its tip; the seventh segment sulcate above. Length 6½ lines; expanse of wings 11½ lines.

Hab.—Rocky Mountains, Colorado Territory.

Resembles *Ich. Ormenus* in size and form, but otherwise quite distinct.

SECTION 2.

14. **Ich. vittifrons,** n. sp.

Black; face whitish, with a broad black stripe down its middle; scutellum white; wings fuscous, hyaline at base; central area of metathorax indistinct.

Male.—Head black, the face below the antennæ, clypeus, orbits not reaching the vertex behind, and the middle of the mandibles, white; the face with a broad black vitta extending from the base of the antennæ to the anterior margin of the clypeus; antennæ porrect, more than half the length of the body, black, the basal joint whitish beneath. Thorax black, shining, rather sparsely punctured, a well impressed longitudinal line on each side of the mesothorax in front, which become obsolete before reaching the disk; tegulæ, a sutural line before and a short line beneath the wings, white; scutellum rather flat, white, with a deep impression at base and connected to the mesothorax on each side by a sharply defined carina; behind the scutellum a short transverse white line; metathorax confluently punctured, the elevated lines indistinct, the central area small, subobsolete, its shape indistinct. Wings broad, dark fuscous, with a strong violaceous reflection, the base especially of the posterior pair, hyaline; nervures black, areolet 5-angular or subtriangular, rather oblique. Legs black, the anterior coxæ beneath, a spot on the intermediate coxæ beneath, the anterior and intermediate femora exteriorly at base, their tarsi and all their tibiæ exteriorly, white. Abdomen elongate, black, closely punctured, shining, especially at tip; basal segment deeply punctured, the peduncle rather short; basal foveæ of the second segment deep and transverse; beneath, black. Length 9 lines; expanse of wings 15 lines.

Hab.—Delaware. Dr. Thos. B. Wilson.

15. **Ich. audax,** n. sp.

Black; face, scutellum and legs in part, yellowish-white; wings subhyaline; central area of metathorax transverse.

Male.—Head black, the face beneath the antennæ, frontal orbits not reaching the vertex, clypeus, a spot on the mandibles, and the palpi, yellowish-white; antennæ two-thirds the length of the body, black, the basal joint beneath whitish. Thorax black, finely and confluently punctured; tegulæ except at base, a sutural line before and a short line beneath the wings, white; scutellum convex, profoundly impressed in front, entirely whitish; metathorax roughly punctured, the elevated lines distinct, the central area transversely subquadrate, its margins smooth and shining. Wings subhyaline, tinged with fuliginous, with a faint violet reflection; nervures and stigma black; areolet 5-angular. Legs black, anterior pair with a spot on their coxæ beneath, and their tibiæ and tarsi white; intermediate pair with the tips of their trochanters and femora, and their tibiæ and tarsi white; posterior pair with a small spot at the base of their femora within, the basal two-thirds of their tibiæ and their tarsi also white; all the tarsal claws black. Abdomen entirely opaque black; basal segment bilineated, finely aciculate, as is also the base of the second segment, the foveæ of which are large and deeply impressed; beneath black. Length 7½ lines; expanse of wings 12½ lines.

Hab.—Rocky Mountains, Colorado Territory.

16. **Ich. caliginosus**, n. sp.

Black; antennæ with a white annulus; scutellum white; wings fusco-hyaline; central area of metathorax large, quadrate and transverse.

Female.—Black, subopaque, densely and finely punctured; clypeus shining, with a few large punctures; antennæ half the length of the body, black, the 10th to 15th joints white above. Thorax densely and confluently punctured, with an abbreviated impressed line on each side of the mesothorax in front; scutellum rather flat, smooth and shining, with a large white spot occupying nearly its whole surface and slightly indented posteriorly; metathorax scabrous, the elevated lines well defined, the central area large and transversely quadrate. Wings fuscous, nervures black, stigma piceous, areolet 5-angular. Legs shining black, inner side of the anterior tibiæ and tarsi whitish. Abdomen entirely black; the first segment broad and finely aciculate, the peduncle slender; basal foveæ of the second segment deep and oblique; apical segments rather smooth and shining; ovipositor subexserted, yellowish. Length 6 lines; expanse of wings 11 lines.

Hab.—Rocky Mountains, Colorado Territory.

17. **Ich. Bronteus**, n. sp.

Black; the face, scutellum and legs in part, yellow; wings subhyaline; central area of metathorax rather large, subquadrate.

Male.—Black, subopaque, closely punctured; the face beneath the antennæ, frontal orbits, clypeus, mandibles except base and apex, and the palpi, yellow; antennæ black, more than half the length of the body, porrect, the basal joint beneath yellow. Thorax somewhat shining above, clothed with short fuscous pubescence, an abbreviated impressed line on each side of the mesothorax in front; the tegulæ, a short line in front and another beneath the wings, yellow; scutellum convex, smooth, yellow, slightly pilose; metathorax scabrous, the elevated lines well defined, the central area rather large, subquadrate. Wings subhyaline, faintly fuliginons, and with a brassy reflection; nervures fuscous, stigma fulvous; areolet 5-angular. Legs yellow, the two anterior pairs of coxæ, except a spot beneath, their femora posteriorly and the posterior coxæ, femora and tibiæ at tip, black. Abdomen long and rather slender, subopaque, densely and finely punctured; the basal segment bilineated and finely aciculate; basal foveæ of the second segment deep; on each side of the third segment at base a small obscure testaceous spot; apical segments smoother; beneath, the second, third and part of the fourth segments are yellowish. Length 8 lines; expanse of wings 12 lines.

Hab.—Pennsylvania. E. T. Cresson.

18. **Ich. tenebrosus,** n. sp.

Black; face and scutellum yellow: legs fulvous; wings hyaline; central area of metathorax quadrate, elongate.

Male.—Head black, the face beneath the antennæ, frontal orbits, clypeus, mandibles except base and apex, and the palpi, yellow; antennæ more than half the length of the body, black, the basal joint beneath yellow. Thorax black, shining, closely punctured; tegulæ, a short line before and another beneath the wings, yellow; scutellum rather flat, yellow, smooth and shining; metathorax roughly punctured, opaque black, the elevated lines well defined, the central area longitudinally quadrate. Wings hyaline; nervures fuscous, testaceous at base, the stigma fulvous; areolet 5-angular. Legs pale fulvous, the anterior and intermediate coxæ black above, yellow beneath, the posterior pair entirely black, as well as the extreme tips of the posterior tibiæ; posterior femora of a more deeper fulvous; tips of tarsi blackish. Abdomen elongate, rather slender, minutely punctured, opaque black, slightly shining towards the apex; first segment bilineated and finely aciculate; basal foveæ of the second segment oblique; on each side of the third segment at base an obscure ferruginous spot; beneath black, the second and third segments pale testaceous, obfuscated on each side. Length 6½ lines; expanse of wings 11½ lines.

Hab.—Rocky Mountains, Colorado Territory.

19. **Ich. pullatus**, n. sp.

Black; face and scutellum white, the former with a black stripe down its middle; wings clear; central area of metathorax transverse, rather large.

Male.—Black; head with the orbits, interrupted behind, the face, clypeus, spot on mandibles, and the palpi, whitish; a broad black vitta extending from the base of the antennæ to the anterior margin of the clypeus; antennæ three-fourths the length of the body, slender, black, the basal joint beneath with a white spot. Thorax densely and finely punctured; the mesothorax in front with a shallow impression on each side; the collar above, tegulæ, a sutural line before and a short one beneath the wings, white; scutellum rather convex, polished, yellowish-white, behind it a small spot of the same color; metathorax rather finely and confluently punctured, the elevated lines tolerably well defined, shining, the central area rather large or moderate, semicircular, transverse, convex in front. Wings almost hyaline, having a very faint tinge of fuliginous especially on the apical margin; nervures fuscous, costa piceous, stigma paler; areolet 5-angular. Legs black, a spot on the anterior coxæ beneath, the anterior femora and tips of the middle femora within and the two anterior pairs of tibiæ and tarsi, except a black line behind, whitish; the basal two-thirds of the posterior tibiæ and the joints of the tarsi exteriorly except their extreme tips also whitish; tips of all the tarsi black. Abdomen elongate, rather slender, shining, densely and finely punctured; basal segment bilineated, rather smooth, the peduncle short; basal foveæ of the second segment small, deep and oblique; apical segments polished; beneath black. Length 6—6½ lines; expanse of wings 10½—11 lines.

Hab.—Delaware (Dr. Wilson); Illinois (Dr. Lewis).

20. **Ich. cordatus**, n. sp.

Black; sides of face, a cordate spot on scutellum and legs in part, white: wings subhyaline; central area of metathorax transverse.

Male.—Head black, the frontal orbits (interrupted on each side of the insertion of the antennæ, narrow above, broader below and constricted on each side of the clypeus), a spot on each side of the clypeus, spot on mandibles, and the palpi, white; antennæ more than half the length of the body, black. Thorax black, shining, closely punctured; a spot on tegulæ, a spot before and a line beneath the wings white; scutellum rather flat, smooth and shining, black with a rather large, cordate, white spot; metathorax black, subopaque, the elevated lines well defined, the central area transverse, subreniform, being rounded in front and emarginate behind. Wings subhyaline, apical margins slightly fuliginous, nervures and stigma black, areolet 5-angular. Legs black, tips of the four anterior femora and their tibiæ and tarsi exteriorly, white, the tips of the latter and the claws, black; inner half of the posterior tibiæ also white. Abdomen elongate, black with a slight tinge of blue, somewhat shining, rather smooth, the punctures close, but distinct and uniform, becoming less obvious towards the tip; first segment bilineated, shining, the peduncle slender; basal foveæ of the second segment obliquely impressed; beneath black. Length 6 lines; expanse of wings 10 lines.

Hab.—Rocky Mountains, Colorado Territory.

21. **Ich. obliteratus,** n. sp.

Black: scutellum white; wings subhyaline, areolet incomplete; central area of metathorax obliterated.

Male.—Jet-black, subopaque, densely punctured; a minute whitish spot at the summit of the eyes; antennæ about half the length of the body, entirely black. Thorax shining above, confluently punctured; a spot on tegulæ, a short line before and a line beneath the wings, white; scutellum rather convex, deeply impressed in front, with a large quadrate white spot; metathorax opaque, scabrous, the elevated lines indistinct, the central area obliterated. Wings subhyaline, apical margins smoky; areolet subtriangular, incomplete, the outer nervure being almost entirely obliterated. Legs black; tips of the anterior and intermediate femora, the anterior tibiæ and tarsi, the intermediate tibiæ and tarsi exteriorly, and the posterior tibiæ at base, white. Abdomen elongate, rather slender; basal segment, broad posteriorly, bilineated and roughly punctured; basal foveæ of the second segment small and indistinct; the second and third segments above densely punctured, the apical ones smoother and shining, especially the sixth and seventh; beneath black, shining. Length 6½ lines; expanse of wings 11 lines.

Hab.—Rocky Mountains, Colorado Territory.

22. Ich. subcyaneus, n sp.

Black, with a bluish tinge; annulus on the antennæ and the scutellum white; wings subhyaline; central area of metathorax quadrate, moderate.

Female.—Black, tinged with blue, shining, finely and densely punctured; frontal orbits pale, subobsolete; antennæ involute, black, 10th to 16th joints whitish. Scutellum flat, polished, yellowish-white; metathorax finely punctured, the elevated lines well defined, the central area moderate, quadrate. Wings almost hyaline, having a faint tinge of fuliginous; nervures fuscous, costa blackish, stigma brown; areolet 5-angular. Legs black, the two anterior pairs tinged with brown. Abdomen stout, subovate, strongly arcuated, deeply tinged with dark blue; basal segment very broad, bilineated, punctured and subobsoletely aciculate, the tip deeply incised; basal foveæ of the second segment transverse, rather deeply impressed; apical segments smooth and polished; ovipositor not exserted. Length 5 lines; expanse of wings 9½ lines.

Hab.—New Jersey. Mr. Wm. Wenzel.

SECTION 3—*a*.

23. Ich. scelestus, n. sp.

Deep black, annulus on the antennæ, spot on scutellum and another on terminal segment of the abdomen whitish; wings dark fuscous; central area of metathorax large, quadrate, elongate.

Female.—Deep black, shining, densely and finely punctured; on each side of the clypeus a deep fovea; antennæ short, slightly involute, black, 9th to 13th joints whitish, spotted on the outside with blackish; scutellum rather flat, polished, with a small yellowish spot posteriorly; metathorax finely and densely punctured, the elevated lines well defined, the central area large, elongate-quadrate. Wings dark fuscous, with a rather strong violaceous and cupreous reflection; nervures and stigma black; areolet 5-angular, with a small hyaline spot on its outer nervure and two others below. Legs deep black, the anterior tibiæ and tarsi pale in front. Abdomen elongate, strongly arcuated, feebly punctured, shining; basal segment bilineated, smooth on the disk and deeply punctured laterally; apical segments polished, the extreme tip with a rounded yellowish-white spot; ovipositor not exserted. Length 6½ lines; expanse of wings 10½ lines.

Hab.—Illinois. Dr. Samuel Lewis.

24. Ich. extrematis, n. sp.

Deep black: annulus on antennæ, scutellum and extreme apex of abdomen above, white; wings subhyaline; central area of metathorax moderate, subquadrate.

Female.—Deep black, somewhat shining, densely and finely punctured; clypeus on each side with a deep fovea; antennæ about half the length of the body, slightly involute, black, 8th to 13th joints above white; scutellum flat, polished, yellowish-white; metathorax finely punctured, the elevated lines well defined, the central area moderate, subquadrate, slightly transverse. Wings subhyaline, tinged with fuliginous; nervures and stigma black, the latter with a pale spot at base; areolet 5-angular, somewhat oblique. Legs black, sericeous, the anterior pair brownish in front, the posterior trochanters white. Abdomen rather stout, subovate, shining, the 2nd and 3rd segments opaque; basal segment rather broad, glossy, bilineated, obsoletely aciculate; basal foveæ of the 2nd segment subobsolete; apical segments polished; terminal segment above and the posterior margin of the 6th segment, white; beneath black; ovipositor not exserted. Length 5 lines; expanse of wings 8 lines.

Hab.—Illinois. Dr. Samuel Lewis.

Closely allied to *Ich. brevicinctor* Say, but is shorter and more robust, and the wings are shorter and darker; it is readily distinguished from Say's species by the posterior trochanters being entirely white.

Ich. brevicinctor Say also belongs to this Section.

SECTION 3—*b*.

25. Ich. cæruleus, n. sp.

Deep blue, shining; thorax tinged with green; orbits, two spots on clypeus, lateral sutures of mesothorax, two short lines on its disk and sides of scutellum, whitish; wings clear; central area of metathorax moderate, quadrate, indistinctly defined.

Female.—Deep dark blue, shining, clothed with a very short pale pubescence; head black with a bluish-green tinge, closely punctured; the orbits (interrupted behind), a round spot on each side of the clypeus, the labrum, a spot on the mandibles and the palpi, whitish; labrum and mandibles fringed with yellowish pubescence; antennæ short, involute, black, the 10th to 15th joints above white, the tip beneath fuscous. Thorax rather closely and finely punctured; the mesothorax black more or less tinged with green, the pleura and metathorax greenish-blue; the collar above, outer margin of the tegulæ, a sutural line before and a short line beneath the wings, and two longitudinal lines on the disk of mesothorax, white; scutellum same color as the mesothorax, sparsely punctured, polished, its lateral margins whitish; postscutellum with a transverse white spot; metathorax finely and confluently punctured, the elevated lines tolerably well defined, the central area moderate, subquadrate, indistinctly defined, smooth and shining. Wings almost hyaline, being faintly tinged with fuscous; nervures and stigma black; areolet 5-angular. Legs black, the anterior coxæ beneath, the four anterior femora at tip and their tibiæ in front, and sometimes the posterior tibiæ at base exteriorly, whitish. Abdomen elongate, stout, brilliant deep blue, closely and finely punctured, shining; basal segment rather broad, bilineated, finely aciculate, and with a small whitish spot, sometimes obsolete or wanting, on each extreme apical corner, the peduncle short; extreme base of the second segment, between the basal foveæ which are deep, is coarsely aciculate; apical segments polished, impunctured. Length 6—8 lines; expanse of wings 10—13 lines.

Hab.—Mass., N. Y., N. J., Penn., Md., Ill. Eight ♀ specimens.

This is a very beautiful species; it agrees in some respects with the description given of *Ich. pulcher* Brullé, but I cannot satisfy myself of their identity. In this species the scape of the antennæ is always black, the face is black with narrow white orbits, and the sides of the mesothorax and surface of the metathorax are not ornamented with yellow lines or spots, as is said to be present in *pulcher*. I have not seen the male.

26. **Ich. Azotus**, n. sp.

Black; face, orbits, lateral lines of mesothorax and two lines on its disk, scutellum, and apex of the first abdominal segment, white; wings hyaline; central area of metathorax moderate, transverse.

Male.—Black, shining; the face beneath the antennæ, orbits, clypeus, mandibles except base, and the palpi, white; antennæ porrect, about three-fourths the length of the body, black, the basal joint beneath white. Thorax finely and closely punctured, with an impressed line on each side of the mesothorax in front; the tegulæ, a broad sutural line before and a short line beneath the wings, and two short lines on the disk above, white; scutellum rather flat, polished, white except its anterior margin which is black; a transverse white line on the postscutellum; metathorax densely and confluently punctured, the elevated lines well defined, the central area moderate, narrow and transverse, the space in front convex. Wings hyaline, slightly fuliginous at tip; nervures and stigma black; areolet 5-angular or subtriangular. Legs black, the two anterior pairs in front and their coxæ beneath, as well as a line on the posterior tibiæ and tarsi behind, white. Abdomen elongate, rather slender, densely and very finely punctured; basal segment bilineated, closely punctured, the extreme apex with a large white spot on the disk and a smaller one on each side, having the appearance of a transverse band trilobed in front; basal foveæ of the second segment large, deep and somewhat oblique; apical segments rather smooth and shining. Length 7½ lines; expanse of wings 11½ lines.

Hab.—Delaware. Dr. T. B. Wilson.

Closely resembles *Ich. otiosus* Say, but the antennæ have no white annulus, the face is entirely white, the colors of the legs are differently arranged and the metathorax has no lateral white spot as is always present in that species.

27. **Ich. agnitus,** n. sp.

Black; antennæ with a broad white annulus; orbits, a spot on each side of clypeus, lateral lines of mesothorax and the scutellum, white; wings subhyaline; central area of metathorax subquadrate.

Female.—Black, shining. Head with the orbits of the eyes and a spot on each side of the clypeus, white; antennæ about half the length of the body, the apex involute, the 9th to 15th joints white, spotted beneath with black. Thorax strongly punctured; tegulæ black; the collar above, a sutural line before and a short line beneath the wings, white; scutellum flat and polished, with a large round white spot covering nearly its entire surface, behind it an obsolete pale spot; metathorax densely and confluently punctured, the elevated lines tolerably well defined, the central area moderate, subquadrate, rather smooth. Wings subhyaline, slightly stained with fuscous; nervures and stigma black; areolet 5-angular or subtriangular, slightly oblique. Legs black, the anterior and middle femora at tip, the anterior tibiæ in front and a spot on the posterior coxæ beneath, white. Abdomen elongate, black, slightly tinged with blue, densely and minutely punctured; basal segment bilineated, broad posteriorly, distinctly punctured and having at its extreme tip above a narrow white line and a minute white dot on each side of it; basal foveæ of the second segment deep; apical segments smooth and shining; ovipositor not exserted. Length 6½ lines; expanse of wings 11 lines.

Hab.—Delaware. Dr. Thos. B. Wilson.

Differs from *Ich. otiosus* Say, by having a white spot on each side of the clypeus, by the absence of the lines on the disk of the thorax, by the different coloration of the legs, by the absence of the lateral spots on the metathorax and by the different shaped central area, which in *otiosus* is transverse, rounded in front and deeply indented behind.

The following species also belong to this Section :—*Ich. unifasciatorius* Say, *Ich. otiosus* Say, *Ich. navus* Say and *Ich. pulcher* Brullé, all of which are known to me, except the last.

SECTION 3—*c*.

28. **Ich. apicalis**, n. sp.

Black; face yellow; scutellum pale; legs and apex of abdomen fulvous: wings subhyaline; central area of metathorax large, quadrate, indistinct.

Male.—Head black, the face beneath the antennæ, frontal orbits, clypeus, mandibles except base and apex, and the palpi, yellow; antennæ rather more than half the length of the body, black, the basal joint beneath yellow. Thorax black, shining, closely punctured; tegulæ, a spot before and a line beneath the wings, yellow; scutellum rather flat, smooth and shining, black, with a subquadrate, obscure yellowish spot; metathorax roughly punctured, opaque black, the elevated lines tolerably distinct, the central area quadrate, not well defined. Wings fusco-hyaline; nervures fuscous, pale at base, stigma fulvous; areolet 5-angular. Legs fulvous, anterior and intermediate coxæ black above, yellow beneath, the posterior pair entirely black; the four anterior legs yellowish in front. Abdomen black, elongate, minutely punctured; first segment finely aciculate, bilineated, the foveæ of the second segment profoundly impressed; second, third and fourth segments opaque, the apical ones smooth and shining; last segment fulvous; beneath blackish, with the middle of the 2nd and three following segments pale yellow, the apical ones fulvous. Length 6 lines; expanse of wings 11 lines.

Hab.—Rocky Mountains, Colorado Territory.

SECTION 4.

29. Ich. variegatus, n. sp.

Black; face, scutellum, metathorax, legs in most part, and basal ½ of second abdominal segment, yellow; rest of abdomen, except basal segment, rufous; wings subhyaline; central area of metathorax subquadrate and transverse.

Male.—Head black, the face beneath the antennæ, frontal orbits, clypeus, spot on mandibles, and the palpi, bright yellow; antennæ porrect, nearly as long as the body, black, basal joint beneath yellow. Thorax black, polished, very finely punctured; tegulæ, a sutural line before and a line beneath the wings, yellow; scutellum slightly convex, polished, entirely bright yellow; metathorax densely punctured, yellow except its anterior and lateral margins, the elevated lines tolerably well defined, the central area moderate, transverse, subquadrate. Wings subhyaline, slightly fuliginous; nervures and stigma piceous, paler at base; areolet 5-angular. Legs bright yellow, the posterior coxæ, femora and apical half of the tibiæ, black. Abdomen elongate, rather slender, opaque, densely and very finely punctured; basal segment black, distinctly bilineated and finely aciculate; second segment bright yellow, its apical half dull rufous, the basal foveæ small, black, coarsely aciculate; remaining segments dull rufous, the third segment having on each side an irregular yellowish stain dilated laterally; apical segments smoother than the basal ones; beneath pale ferruginous, the middle of the segments stained with yellowish. Length 8 lines; expanse of wings 11½ lines.

Variety ♂.—Differs from the above as follows:—The four anterior femora have a black spot behind, the wings are clearer, the apical half of the 2nd abdominal segment is yellowish-ferruginous as also the basal foveæ, the 3rd segment above is entirely yellow, except the basal incisure which is black, the remaining segments are dull rufous, the 4th and 5th each having a narrow black fascia at base. Length 6½ lines.

Hab.—Rocky Mountains, Colorado Territory.

30. Ich. inconstans, n. sp.

Black; face, scutellum, legs, the 2nd, 3rd, 4th and two apical segments of abdomen, more or less yellow; wings subhyaline; central area of metathorax moderate, subquadrate.

Male.—Head black; the face beneath the antennæ, clypeus, mandibles (except the base which is piceous), and the palpi pale yellow; antennæ porrect, rather more than half the length of the body, black, basal joint beneath yellow. Thorax black, minutely punctured, shining; tegulæ, a spot before and a line beneath the wings, white; scutellum flat, polished, white; metathorax entirely black, finely and confluently punctured, opaque, the elevated lines well defined, the central area moderate, subquadrate, rounded in front and obtusely indented behind. Abdomen elongate, rather slender, finely and densely punctured; basal segment black, distinctly bilineated and finely aciculate; second and third segments bright yellow, their apical third stained with ferruginous and their extreme apex obfuscated; fourth segment brown-black with a large angular yellow spot on each side, almost meeting on the disk; the two following segments black, the apical ones fulvous; beneath colored as above. Length 7—8 lines; expanse of wings 11—11½ lines.

Hab.—Rocky Mountains, Colorado Territory.

31. **Ich. Grotei,** n. sp.

Black; face and scutellum yellow; metathorax yellowish-ferruginous; abdomen ferruginous and yellow, banded with black; central area of metathorax small, transverse.

Male.—Head black; the face beneath the antennæ, orbits, clypeus, mandibles except base and extreme tips, and the palpi, yellow; antennæ porrect, rather more than half the length of the body, brown-black, basal joint beneath yellow. Thorax black, finely and rather closely punctured, shining; tegulæ, a broad sutural line before and a short one beneath the wings, an oblique line on each side of the pectus, yellow or yellowish-ferruginous; a spot on each side of the pleura and two lines on the disk of the mesothorax, almost confluent behind and diverging in front, rufous and subobsolete; scutellum rather convex, shining, yellow, immediately behind it a short transverse yellowish-ferruginous line; metathorax almost entirely yellowish-ferruginous, the elevated lines tolerably well defined, the central area small, transverse, subquadrate, the posterior margin bent inwards. Wings subhyaline, with a brassy gloss, the apical margin faintly tinged with fuliginous; nervures blackish, pale testaceous at base, as well as the outer margin of the costa; stigma fulvous; areolet 5-angular. Legs yellow, more or less varied with fulvous, the posterior coxæ, trochanters, femora and tips of the tibiæ fulvous, the latter obfuscated at tips. Abdomen long and rather slender, densely and finely punctured, opaque-yellow, varied with fulvous or pale ferruginous, the tips of the first, second, third and fourth segments bright yellow, their middle yellowish-ferruginous, their basal third black, as well as the base of the fifth and sixth segments, the remainder of these segments and also the apical segment entirely, fulvous; basal segment distinctly bilineated; basal foveæ of the second segment small and transverse; fifth and following segments smoother than the preceding ones, and somewhat shining; beneath, the segments are yellow varied with fulvous, the basal segment black, the middle of the second and three following segments yellow with a black spot on each side at base; apical segments fulvous. Length 6½—7½ lines; expanse of wings 11—12½ lines.

Variety ♂.—Differs from the above by having the cheeks, disk of the thorax above and the sides of the pleura more or less yellowish-ferruginous; in one specimen the pleura has on each side a broad yellowish-ferruginous dash. Length 6 lines.

Hab.—Rocky Mountains, Col. Ter. Illinois. Dr. Saml. Lewis.

The two specimens from Illinois are not so bright in color as those from Colorado, the ferruginous color being very dull, approaching fuscous, especially at the apex of the abdomen. I have no doubt of their identity.

I dedicate this beautiful species to my friend Mr. Aug. R. Grote of New York.

Ich. jucundus Brullé also belongs to this Section.

SECTION 5.

32. Ich. nobilis, n. sp.

Black; face, scutellum, metathorax and legs in part, and posterior portion of the first 4 abdominal segments, yellow; central area of metathorax transverse.

Male.—Head black; the face beneath the antennæ, orbits, clypeus, mandibles and palpi, yellow; antennæ porrect, about half the length of the body, black, basal joint beneath yellow. Thorax black, shining, closely punctured, clothed with short fuscous pubescence; collar above, tegulæ, a broad sutural line before and a short line beneath the wings, yellow; scutellum convex, yellow, as well as a short line behind it; metathorax mostly yellow, its anterior, posterior and lateral margins black, the elevated lines well defined, the central area moderate, transverse. Wings subhyaline, stained with yellowish; nervures fuscous, testaceous at base, stigma fulvous; areolet 5-angular. Legs yellow, a spot on the intermediate coxæ beneath, the posterior coxæ, their femora except extreme base and apex, and the tips of their tibiæ, black. Abdomen elongate, stout, black; the first segment, except peduncle, apical two-thirds of the second, and the apical half of the two following segments, yellow; remaining segments black, narrowly margined at tip with obscure yellowish, shining; basal segment bilineated, finely aciculate; basal foveæ of the 2nd segment small; beneath colored same as above, except that the black bands of the 2nd, 3rd and 4th segments are interrupted on the middle. Length 9 lines; expanse of wings 15 lines.

Hab.—Illinois. Dr. Saml. Lewis.

Closely resembles *Ich. lætus* Brullé, but is much larger, the wings longer, and the central area of the metathorax differently shaped; the colors are arranged pretty much the same, but the apical segments of *lætus* are always black.

I would remark here that *Ich. parata* Say, Contrib. Macl. Lyc. i, p. 68, and *Ich. parata* Say, Bost. Journ. Nat. Hist. i, p. 228, refer to two separate and distinct species; the former belongs, I think, to *Ischnus*, and the latter is a true *Ichneumon*, and identical with *Ich. lætus* Brullé,—Say having mistaken the two for ♂ and ♀ of the same species. I have six specimens of the former species, all males, and fifteen of the latter, also all males. They are widely distinct and answer exactly to the descriptions given of them. I have therefore separated the two as follows:—

Ischnus paratus Say.—*Ichneumon parata* Say, Contrib. Macl. Lyc. i, p 68.
Ichneumon lætus Brullé.—*Ich. parata* Say, Bost. Jour. Nat. Hist. i, p. 228.

33. **Ich. flavizonatus**, n. sp.

Black; face, scutellum, legs, two spots on metathorax and 5 bands on the abdomen, yellow; wings subhyaline; central area of metathorax transverse.

Black; the face, clypeus, mandibles except base and apex, frontal orbits not reaching the vertex, and the palpi, yellow; antennæ about half the length of the body, porrect, black or brown above, fulvous beneath, obfuscated at the tips, the basal joint beneath yellow. Thorax densely and finely punctured; the collar above, tegulæ, a short sutural line before and a short line beneath the wings, yellow; scutellum rather convex, polished, entirely yellow, with a small transverse spot immediately behind it; metathorax densely and rather finely punctured, opaque black, with a rather large yellow spot on each side, sometimes reduced to a small round spot, the elevated lines well defined, the central area subquadrate, transverse, moderate, its margins polished. Wings subhyaline, more or less stained with fuscous; nervures fuscous, testaceous at base; stigma fulvous; areolet 5-angular or subtriangular. Legs yellow, the posterior coxæ beneath and the tips of their femora and tibiæ, black; tips of the tarsi sometimes blackish. Abdomen elongate, opaque, finely punctured, the punctures coarser at base of the second segment; basal segment distinctly bilineated and finely aciculate; basal foveæ of the second segment deep, coarsely aciculate; apex of all the segments above with a more or less broad yellow or yellowish-white band, sometimes slightly indented anteriorly; in one specimen the bands are much narrowed and that on the 5th segment is wanting and that on the 7th segment is interrupted in the middle; in another specimen the bands of the two apical segments are nearly white and occupy almost the whole surface; beneath pale fulvous, the 2nd, 3rd and 4th segments each with a large lateral blackish spot, remaining segments black. Length 7½ lines; expanse of wings 12 lines.

Hab.—New York (Mr. James Angus); Virginia (Dr. T. B. Wilson).

Allied to *Ich. lætus* Brullé, but is more robust, the bands of the abdomen much narrower and continued on the apical segments, and the central area of the metathorax is transverse.

34. **Ich. atrifrons**, n. sp.

Black, antennæ with a broad whitish annulus; scutellum, sides of metathorax, and the apical and lateral margins of the abdominal segments, yellow; legs fulvous varied behind with yellow; wings clear; central area of metathorax, elongate-quadrate.

Female.—Black, somewhat shining, finely and densely punctured; head entirely black, except the frontal orbits above the antennæ which are broadly yellow; antennæ two-thirds the length of the body, black, the 10th to 15th joints whitish, basal joint beneath pale brownish. Thorax: collar above, tegulæ, a short sutural line before and a spot beneath the anterior wings, another spot beneath the posterior pair and a round spot on each side of the pleura immediately over the intermediate coxæ, yellow; scutellum flat, polished, yellow, with a transverse yellow spot behind it, the carina on each side in front of the scutellum with a small yellow spot exteriorly; metathorax finely and densely punctured, black, with a very large longitudinal spot on each side of the middle and a small rounded yellow spot on the extreme sides, the elevated lines well defined, the central area moderate, quadrate, elongate. Wings hyaline, nervures testaceous, stigma pale fulvous, areolet 5-angular. Legs dull fulvous, the coxæ, trochanters and the four anterior femora behind yellow, posterior coxæ at base beneath and at the insertion of the trochanters behind, black. Abdomen elongate, rather robust, strongly arcuated, basal segments opaque, apical ones shining; basal segment rather narrow, bilineated, finely aciculate; basal foveæ of the second segment scarcely impressed; the apical and lateral margins of all the segments, broader at the apical corners, yellow; beneath blackish; ovipositor fulvous, exserted about half a line. Length 5 lines; expanse of wings 8½ lines.

Hab.—Illinois. Dr. Samuel Lewis.

To this Section also belongs *Ich. comptus* Say and *Ich. concinnus* Say, the last of which is unknown to me.

SECTION 6.

35. **Ich. comes**, n. sp.

Black; face, two lines on mesothorax, scutellum, spot on pleura, W on metathorax, legs in part, and the 2nd and 3rd abdominal segments, yellow; central area of metathorax quadrate.

Male.—Head black; face beneath the antennæ, frontal orbits, clypeus, mandibles except tips, palpi, and a spot on the cheeks just above the base of the mandibles, yellow; antennæ porrect, about two-thirds the length of the body, black, basal joint beneath, yellow. Thorax black, shining, finely punctured; collar above, tegulæ, a broad sutural line before and a narrow one beneath the wings, two lines on the disk of mesothorax (which are confluent before reaching the posterior margin, diverging in front and becoming confluent with the sutural lines), and a rather large irregular mark on pleura, enclosing a small black spot, yellow; scutellum convex, yellow, polished, behind it a short, transverse, yellowish spot; the lateral carinæ of the scutellum have an exterior yellow spot; metathorax scabrous, black, with a yellow mark behind having somewhat the shape of a W; elevated lines well defined. the central area moderate, quadrate, not at all transverse. Wings subhyaline, slightly stained with yellowish; nervures pale fuscous, testaceous at base, stigma pale fulvous; areolet 5-angular. Legs yellow; the posterior coxæ, their femora except extreme base, and the apex of their tibiæ, black; tips of the tarsi brown, the four anterior femora stained with blackish behind. Abdomen elongate, rather stout, black; the 2nd, except a transverse irregular blackish mark at tip, and the whole of the 3rd segment, yellow; basal segment bilineated, finely aciculate; basal foveæ of the 2nd segment deep; apical segments smoother than the basal ones; beneath colored same as above, except that the 4th segment is stained with yellowish. Length 7—8½ lines; expanse of wings 12—13½ lines.

Hab.—Illinois (Dr. Saml. Lewis); Delaware (Dr. T. B. Wilson).

The lines on the disk of the mesothorax, and the irregular mark on the pleura are sometimes wanting; the foveæ of the 2nd abdominal segment are sometimes black, and the irregular black mark on the apical half of this segment sometimes forms a regular band.

This species is closely allied to *Ich. lætus* Brullé, and may possibly prove to be a variety of it. The wings are, however, longer, the antennæ are entirely black, except the basal joint beneath, and the basal segment of the abdomen is always black; only two segments are yellow, while *lætus* has four.

36. Ich. parvus, n. sp.

Black; face, scutellum; legs in part, and the apical half of the three first abdominal segments, yellow; wings subhyaline; central area of the metathorax moderate, subquadrate.

Male.—Black, finely punctured, shining; the face, clypeus, spot on mandibles and the palpi, yellow; antennæ about half the length of the body, porrect, black, the basal joint beneath yellow. Thorax entirely black; scutellum slightly convex, polished, entirely yellow; metathorax finely punctured, the elevated lines well defined, the central area moderate, subquadrate, somewhat elongate, rounded in front and indented behind. Wings subhyaline, slightly iridescent; nervures fuscous, paler at base, stigma brown or fulvous; areolet 5-angular. Legs yellow; the coxæ, the four anterior femora behind, the posterior femora entirely and their tibiæ at tips black; tips of the tarsi blackish, and sometimes the posterior tarsi are almost entirely blackish. Abomen elongate, rather slender, apical segments smooth and shining, the basal ones finely punctured; basal segment bilineated, finely aciculate; basal foveæ of the second segment small, not deep; apex of the first segment and the apical two-thirds of the two following segments yellow, in one specimen the apical middle of the fourth segment is obscurely yellowish; beneath colored same as above. Length 4½ lines; expanse of wings 7 lines.

Hab.—New York (Mr. Angus); Illinois (Dr. Lewis).

About half the size of *Ich. lætus* Brullé, which it resembles in color, except that the meso- and metathorax are immaculate.

37. **Ich. pictifrons**, n. sp.

Black, face spotted with yellow; scutellum, legs in part, and the 2nd and 3rd abdominal segments yellowish; wings subhyaline; central area of metathorax large, transversely quadrate.

Male.—Black, very finely punctured; a wedge-shaped stripe on each side of the face, two small spots immediately beneath the antennæ, clypeus, except a blackish spot on its middle, and a spot on the mandibles, yellow; antennæ more than half the length of the body, porrect, black, tip of the basal joint beneath yellowish. Thorax entirely black; scutellum slightly convex, yellow, stained with fulvous at base and apex; metathorax finely and densely punctured, the elevated lines well defined, the central area large, transversely quadrate, its posterior margin rather indistinct. Wings subhyaline, slightly stained with fuliginous, and having a slight violaceous reflection at tips; nervures blackish, stigma brown; areolet 5-angular. Legs yellowish; the coxæ, the four anterior femora behind, the posterior femora entirely and the apex of the posterior tibiæ, black; tips of the tarsi also blackish. Abdomen elongate, rather slender, basal segment bilineated and finely aciculate; basal foveæ of the second segment large and deeply impressed; apical segments smooth and shining; the second and third segments yellowish-fulvous, the anterior half of the second segment paler; beneath colored same as above. Length 5 lines; expanse of wings 7½ lines.

Hab.—Rocky Mountains, Colorado Territory.

38. **Ich. bizonatus**, n. sp.

Black; face, annulus on antennæ, scutellum, legs in part, and two bands on abdomen, yellow; wings subhyaline; central area of metathorax large, quadrate.

Female.—Head black, shining, sides of the face and frontal orbits, yellow, the latter tinged with ferruginous near the summit of the eyes;

middle of the face and the clypeus rufous, the latter with a yellow spot on each side, the mandibles near their tips also rufous; antennæ two-thirds the length of the body, black, the basal joint beneath yellow, and the 8th to 12th joints yellowish-white, spotted beneath with black. Thorax black, rather densely and closely punctured, shining, the tegulæ and a spot before the wings honey-yellow; a line beneath the wings and the scutellum yellow, the latter flat, smooth and shining; metathorax scabrous, the elevated lines well defined, the central area large, quadrate. Wings subhyaline, slightly stained with fuscous and having a brassy gloss, the nervures and stigma testaceous, the areolet 5-angular. Legs black, apex of the anterior and intermediate femora and the tibiæ and tarsi yellow, the latter obfuscated at tips, the anterior femora stained with ferruginous on the inside; the posterior femora entirely black, the basal half of their tibiæ yellow, the tarsi dusky. Abdomen black, the petiole rather slender; first segment bilineated, finely aciculate, the second and third segments above very finely and closely punctured, the remaining segments smooth and shining; at the base of the second and third segments above a rather narrow transverse yellow band, the posterior margin of which is denticulated, that on the second segment covering the base and extending down for a short distance on each side of the segment, that on the third segment not quite reaching the base and is somewhat dilated on each side; beneath, the second, third and fourth segments are yellowish, the rest black; ovipositor scarcely exserted. Length 6 lines; expanse of wings 11 lines.

Hab.—Rocky Mountains, Colorado Territory.

SECTION 7—*a*.

39. **Ich. ambiguus,** n. sp.

Black: the face, orbits, two lines before the wings, scutellum and the anterior legs in front, white: wings fuliginous; central area of metathorax small, subconical.

Male.—Elongate. Head black, the face beneath the antennæ, the orbits interrupted behind, clypeus, spot on mandibles, and the palpi, white; antennæ porrect, more than half the length of the body, black, basal joint beneath white. Thorax black, shining, closely punctured; mesothorax in front with two impressed longitudinal lines reaching the disk; the collar above, an abbreviated sutural line before and a dot beneath the wings, white; scutellum flat, polished, with a large round white spot; metathorax scabrous, the elevated lines well defined, the central area small, elongate, subconical, smooth and polished. Wings fuliginous, darkest along the costa; nervures and stigma black, the latter with a pale spot at base; areolet 5-angular. Legs black, the intermediate coxæ beneath with a rounded white spot, the anterior and intermediate legs in front white, tarsal claws black. Abdomen elongate, sublinear, depressed, opaque yellowish-ferruginous; basal segment black, bilineated, finely aciculate at tip; basal foveæ of the second segment deep and oblique; apical segments somewhat shining. Length 10 lines; expanse of wings 15 lines.

Hab.—Pennsylvania. E. T. Cresson.

40. **Ich. vinulentus,** n. sp.

Black; face, scutellum and legs in part, white; abdomen rufous; wings subhyaline; central area of metathorax quadrate.

Male.—Head black, the face below the antennæ, frontal orbits, clypeus, a spot near the tip of the mandibles, and the palpi, white; antennæ two-thirds the length of the body, blackish, the basal joint beneath white. Thorax black, shining, finely, closely and uniformly punctured; tegulæ, a cuneiform mark before and a short line beneath the fore-wings, white; scutellum almost flat, smooth, shining and entirely white; metathorax opaque black, finely scabrous, the elevated lines smooth and shining, the central area large, quadrate, not at all transverse, more finely sculptured than the rest of the metathorax. Wings subhyaline, with a slight brassy gloss; the nervures and stigma dark fuscous, the former much paler at base; areolet 5-angular or almost triangular. Legs white; the coxæ, except a small spot posteriorly, the outer surface of the anterior and intermediate femora except their extreme base and apex, the posterior femora except their extreme base, and almost the terminal half of the posterior tibiæ, black. Abdomen rufous; the basal segment black, distinctly bilineated, finely aciculate, interspersed with a few punctures at base; basal foveæ of the second segment deep and somewhat oblique, this and the following segments opaque, very densely and finely punctured, the punctures becoming finer and the surface smoother towards the apex. Length 7½ lines; expanse of wings 12½ lines.

Hab.—Rocky Mountains, Colorado Territory.

41. Ich. consimilis, n. sp.

Black; face, scutellum and legs in part, yellow; abdomen brick-red; wings subhyaline; central area of metathorax subquadrate, moderate.

Male.—Head black, the face below the antennæ, frontal orbits, clypeus, mandibles except base and apex, and the palpi, yellow; antennæ two-thirds the length of the body, black, the basal joint beneath with a broad yellow line. Thorax black, finely, closely and uniformly punctured; tegulæ, a narrow sutural line before the wings abbreviated before and suddenly dilated behind, and a short line beneath the wings, yellow; scutellum convex, entirely pale yellow; a small, transverse, subobsolete, yellowish line behind the scutellum; metathorax black, rather finely rugose, the elevated lines well defined; the central area subquadrate, rounded in front and obtusely emarginate behind. Wings subhyaline, slightly tinged with fuscous and with a brassy gloss; nervures fuscous, testaceous at base, stigma fulvous; areolet 5-angular or subtriangular. Legs yellow; coxæ, trochanters, anterior and intermediate femora exteriorly except tips, the posterior femora entirely, as well as the tips of the posterior tibiæ, black. Abdomen brick-red, darker towards the apex; basal segment black, distinctly bilineated, finely aciculate; basal foveæ of the second segment deep and somewhat oblique, and between which the surface is finely aciculate; second and following segments opaque, very finely and densely punctured; ventral segments stained with yellowish, with a more or less dusky spot on each side especially towards the tip. Length 7½ lines; expanse of wings 12½ lines.

Hab.—Rocky Mountains, Colorado Territory.

Closely resembles *Ich. vinulentus*, but besides the difference of color, the scutellum is much more convex and the sculpture of the metathorax is different, the central area being smaller and differently shaped.

42. Ich. juxtus, n. sp.

Black; face, scutellum and legs in part, yellow; abdomen dull ferruginous; wings subhyaline; central area of metathorax large, transversely subreniform.

Male.—Head black, the face beneath the antennæ, frontal orbits, clypeus, mandibles except base and apex, and the palpi, yellow; antennæ more than half the length of the body, black, the basal joint beneath yellow. Thorax black, finely punctured; a sutural line before the wings, tegulæ and a line beneath the wings, pale yellowish; a subobsolete, quadrate, ferruginous spot on the disk of the mesothorax; scutellum rather flat, pale yellowish, shining, a short transverse line of the same color just behind; metathorax opaque black, with a subobsolete, longitudinal, rufous stripe on each side; densely and roughly punctured, clothed like the head and thorax with short pale brownish pubescence; the elevated lines well defined, the central area large, transversely subreniform, being broadly rounded in front and emarginate behind. Wings subhyaline. with a faint violaceous and brassy gloss; nervures fuscous, pale at base, stigma ferruginous; areolet 5-angular. Legs yellow; the four anterior coxæ black, more or less stained with ferruginous beneath, as well as their femora beneath; posterior coxæ black with a subobsolute rufous spot behind, their femora, except their base and trochanters which are rufous, and the tips of their tibiæ, black. Abdomen dull ferruginous, the apical margin of each segment with an indistinct darker stain, the basal half of the petiole blackened; first segment distinctly bilineated and finely aciculate; basal foveæ of the second segment small, not deep, this and the following segments densely and finely punctured, the punctures becoming finer and the surface smoother towards the tip; beneath, the basal segment is black, the disk of the second and third and the apical margin of the following segments are yellowish. Length 7½ lines; expanse of wings 12½ lines.

Hab.—Rocky Mountains, Colorado Territory.

Resembles the two preceding species, but differs much in the distribution of color, and especially in the shape of the central area of the metathorax which in this species is transversely subreniform, while in the two preceding species it is quadrate or subquadrate.

43. **Ich. animosus,** n. sp.

Black; face, scutellum and legs in part, yellow; wings hyaline; abdomen dull rufous banded with black; central area of metathorax elongate.

Male.—Head deep black, shining; face beneath the antennæ, frontal orbits, clypeus, mandibles, except base and apex, and the palpi, bright yellow; antennæ two-thirds the length of the body, black, basal joint beneath bright yellow. Thorax deep black, shining, finely and rather sparsely punctured; tegulæ, a short line before and a line beneath the wings, yellow; scutellum rather flat, shining, entirely bright yellow, except a sinuate line at base, which gives the yellow a cordate appearance with its apex truncate; metathorax scabrous, opaque black, the elevated lines well defined, the central area rather small, elongate, narrow, rounded in front and truncate behind. Wings nearly hyaline; nervures fuscous, pale testaceous at base, stigma and most of the costa fulvous; areolet 5-angular. Legs bright yellow; anterior coxæ black above, yellow beneath, intermediate pair almost entirely yellow, having a black stripe on the exterior side, posterior pair entirely black; posterior side of the four anterior femora with a broad black vitta margined above with pale ferruginous, posterior femora, except extreme base and apex, and the apical half of their tibiæ, black. Abdomen dull rufous, subopaque; basal segment black, bilineated, faintly aciculate, with a subobsolete rufous dot at the extreme tip; on each side of the second segment at base a somewhat obliquely impressed fovea; a black mark occupies nearly the basal half of this segment, the posterior margin being concave and leaving an obtuse lobe on each side not touching the lateral margin of the segment; basal margin of the four following segments black, that on the third segment slightly and gradually dilated on the disk, that on the fourth and fifth segments suddenly and broadly dilated on the disk reaching the middle of the segments, that on the sixth segment small; the apical segment entirely rufous; beneath pale rufous, stained with yellowish on the middle of the second, third and fourth segments. Length 6½ lines; expanse of wings 11 lines.

Hab.—Rocky Mountains, Colorado Territory.

44. Ich. vultus. n. sp.

Black; face bright yellow; legs and abdomen rufous; wings subhyaline; central area of metathorax rather large, lunate.

Male.—Black, finely and densely punctured; face beneath the antennæ, orbits, interrupted behind, clypeus and spot on mandibles, bright yellow; palpi pale; antennæ more than half the length of the body, porrect, black, opaque, basal joint beneath yellowish. Thorax shining; tegulæ, a dot before them and the apical half of the scutellum pale honey-yellow; scutellum rather flat, polished; metathorax densely punctured, the elevated lines sharply defined, the central area rather large, lunate, transverse, rounded in front and indented behind. Wings subhyaline, slightly tinged with fuliginous; nervures and stigma fuscous; areolet 5-angular or subtriangular. Legs rufous, tibiæ and tarsi tinged with yellow, the coxæ, trochanters and the apex of the posterior tibiæ, black. Abdomen elongate, finely and closely punctured, shining, rufous, base of petiole blackish; basal segment not much dilated, bilineated, the disk with a shallow fovea; basal foveæ of the second segment deep and oblique; basal incisures of the 3rd and 4th segments blackish; apical segments smooth and polished, the last one tinged with yellowish. Length 4 lines; expanse of wings 6½ lines.

Hab.—Rocky Mountains, Colorado Territory.

45. **Ich. fuscifrons**, n. sp.

Black; face dark brown, basal half of antennæ, two spots on metathorax, legs and abdomen rufo-fuscous; scutellum and middle of antennæ white; wings hyaline; central area of metathorax rather large and subquadrate.

Female.—Head black, the face beneath the antennæ, the frontal orbits, the clypeus and mandibles, dark brown; palpi paler; antennæ about half the length of the body, the 8 basal joints rufo-fuscous, the 7 following white and the remainder black above, fuscous beneath. Thorax black, clothed with short yellowish-sericeous pubescence; the tegulæ, a spot before and another beneath the posterior wings, rufous; a short line beneath the anterior wings and the scutellum, yellowish-white, the latter rather flat, polished; metathorax densely punctured, opaque, with a dull rufous spot on each side, the elevated lines sharply defined, the central area large, subquadrate, slightly elongate. Wings hyaline, nervures fuscous, stigma pale testaceous, areolet 5-angular. Legs pale rufo-fuscous, the intermediate coxæ yellowish beneath. Abdomen elongate, rufo-fuscous; a small spot on each side of the first segment at tip, an obsolete spot on each side of the third segment posteriorly and the disk of the two apical segments, yellowish; basal segment with the peduncle black, rather slender; apical segments smoother and somewhat shining. Length 6 lines; expanse of wings 9 lines.

Hab.—Illinois. Dr. Samuel Lewis.

46. **Ich. funestus**, n. sp.

Black; head varied with dull rufous; antennæ with a white annulus; scutellum yellow; abdomen rufo-fuscous; wings hyaline; central area of metathorax large, quadrate.

Female.—Head black, the orbits (yellowish in front), and the lower part of cheeks, dull rufous; antennæ short, involute, black, 9th to 15th joints white. Thorax feebly punctured, shining, black; beneath the anterior wings a short yellowish line; scutellum flat, polished, yellow, with a yellow spot behind; metathorax finely punctured, the elevated lines well defined, the central area large, quadrate, slightly transverse. Wings subhyaline, faintly tinged with fuliginous; nervures fuscous; stigma fulvous; areolet 5-angular or subtriangular. Legs black, the tibiæ piceous and the tarsi ferruginous. Abdomen robust, strongly arcuated, rufo-fuscous, polished towards the apex; basal segment blackish, bilineated, finely aciculate; basal foveæ of the second segment rather deep and coarsely aciculate; ovipositor not exserted. Length 5 lines; expanse of wings 8½ lines.

Hab.—Pennsylvania. Mr. J. H. B. Bland.

To this Section also belongs *Ich. grandis* Brullé, *Ich. devinctor* Say (=*tibialis* Brullé), and *Ich. succinctus* Brullé, the first of which is unknown to me.

SECTION 7—*b*.

47. **Ich. seminiger**, n. sp.

Dull rufous; apex of antennæ, thorax beneath, metathorax and basal margin of 3rd and 4th abdominal segments, black; scutellum yellow; wings subhyaline; central area of metathorax large, subquadrate.

Female.—Dull rufous. Head: palpi pale; antennæ about half the length of the body, involute, the 1st to 8th joints rufous, sometimes fuscous, the 9th to 15th joints whitish or yellowish, the remainder blackish or brownish, the basal joint beneath always rufous. Thorax finely punctured, shining, black; the mesothorax above dull rufous; scutellum flat, polished, yellow; metathorax finely punctured, black, the elevated lines well defined, the central area large, subquadrate, truncate in front and deeply indented behind. Wings subhyaline, slightly and uniformly stained with fuscous; nervures fuscous, paler at base; stigma pale fulvous; areolet 5-angular, rather oblique. Legs rufous, shining, coxæ black, the four anterior ones occasionally reddish beneath. Abdomen rather short, robust; basal segment broad, bilineated, finely aciculate, and having a small round yellowish spot on each side, sometimes obsolete or wanting; petiole black; basal foveæ of the second segment small, not deep; basal margin of the third and fourth segments above narrowly black; apical segments smoother than the basal ones; ovipositor not exserted. Length 5½ lines; expanse of wings 9½ lines.

Hab.—Mass., N. J., Penn., Virginia.

Allied to *Ich. suturalis* Say, but differs by the tricolored antennæ, by the thorax beneath and the metathorox being black, and by the central area of the latter being quadrate and not at all elongate.

48. **Ich. discus.** n. sp.

Black; face, mesothorax, scutellum, legs and abdomen, except sutures. fulvo-ferruginous; wings subhyaline: central area of metathorax large, quadrate.

Male.—Head black, shining; face beneath the antennæ, frontal orbits, clypeus and mandibles, except base and apex, yellowish-fulvous; palpi yellowish; antennæ about half the length of the body, black, the basal joint beneath fulvous. Thorax black, closely punctured, shining, the disk above, and a spot before the wings, obscure ferruginous; scutellum rather flat, smooth and shining, yellowish-ferruginous; metathorax opaque black, the elevated lines well defined, the central area large, quadrate, slightly transverse. Wings subhyaline, slightly stained with fuliginous; nervures blackish, testaceous at base, stigma fuscous; areolet 5-angular. Legs fulvous above, yellow beneath; the coxæ and a spot on the trochanters, black, the four anterior coxæ with a large yellow spot beneath. Abdomen ferruginous, darker towards the apex; basal segment black, distinctly bilineated, and having an obscure ferruginous spot at the extreme tip; basal margin of the second and three following segments narrowly black, the second and third segments above paler ferruginous than the others; beneath, the segments are dull ferruginous, stained with fuscous on the disk of the second, third and fourth segments. Length 6 lines; expanse of wings 10 lines.

Hab.—Rocky Mountains, Colorado Territory.

49. **Ich. subrufus**, n. sp.

Dull rufous; tips of antennæ, pectus, pleura, metathorax and coxæ black; scutellum and basal portion of antennæ tinged with yellowish: wings fusco-hyaline; central area of metathorax obsolete.

Female.—Dull rufous; antennæ about half the length of the body, involute at tip, the 17 basal joints submoniliform, rufous, golden sericeous, apical joints black. Thorax finely punctured, shining, black; the collar and mesothorax rufous, the latter slightly stained on the disk in front with fuscous; scutellum rather flat, polished, yellowish-ferruginous; metathorax black, finely punctured, the elevated lines not distinct, the central area obsolete. Wings fusco-hyaline with a yellowish tinge; nervures fuscous, paler at base; stigma fulvous; areolet 5-angular. Legs pale rufous, the coxæ black. Abdomen elongate; basal segment broad, bilineated, finely aciculate; basal foveæ of the second segment oblique, not deep; terminal margins of the segments with an indistinct darker stain; apical segments smooth and polished; beneath slightly tinged with yellowish; ovipositor not exserted. Length 7 lines; expanse of wings 10½ lines.

Hab.—Virginia. Dr. Thos. B. Wilson.

Allied to *Ich. seminiger*, but differs by being larger and more elongate, by the bicolored antennæ, by the central area of the metathorax being obsolete, and by the abdomen being entirely rufous.

50. **Ich. vicinus**, n. sp.

Dull rufous; antennæ tricolored; scutellum yellowish-white; sutures of the thorax and of the third and fourth segments of abdomen black; wings clear; central area of metathorax rather large, elongate-quadrate.

Female.—Dull rufous, approaching brown, shining; antennæ about half the length of the body, slightly involute, the 1st to 8th joints rufous, the 9th to 14th white above, spotted with rufous beneath, apical joints blackish. Thorax feebly punctured, the sutures of the pleura, the surface beneath between the four anterior legs, and the spaces on each side of scutellum, blackish; scutellum rather flat, polished, pale yellow; metathorax finely punctured, the elevated lines distinct, the central area large, longitudinally quadrate. Wings almost hyaline; nervures fuscous, testaceous at base; stigma pale fulvous; areolet 5-angular. Legs rufous, the basal third of the posterior femora and tips of their tibiæ black. Abdomen elongate, subovate; basal segment almost smooth, shining, bilineated, indistinctly aciculate; basal foveæ of the second segment oblique and scarcely impressed; basal margin of the third and fourth segments above narrowly black; apical segments smooth and polished; ovipositor not exserted. Length 5 lines; expanse of wings 8 lines.

Hab.—Illinois. Dr. Samuel Lewis.

Resembles *Ich. seminiger*, but not so robust, the thorax above and beneath and the metathorax is rufous, not black, and the basal segment of abdomen not so broad as in that species.

51. **Ich. rutilus**, n. sp.

Pale rufous; antennæ fuscous, with a broad whitish annulus; incisures of thorax blackish; scutellum white; wings subhyaline; central area of metathorax large, subquadrate.

Female.—Pale rufous; frontal orbits yellowish; clypeus rather large, truncate in front, with a deep puncture on each side; its apical two-thirds, as well as the mandibles, blackish; palpi dusky; eyes prominent; antennæ as long as the body, fuscous, the base of the 3 or 4 basal joints rufous, the 9th to 13th joints white, basal joint beneath entirely rufous. Thorax densely punctured, dull rufous, tinged with brown, the incisures blackish; the dorsal lines scarcely impressed; a dot before and a line beneath the anterior wings, yellow; scutellum flattened, pale yellowish-white, polished, the space on each side blackish, as well as the postscutellum except a small rufous spot beneath the scutellum; metathorax densely punctured, pale rufous, tinged laterally with yellowish, the elevated lines tolerably well defined, the central area large and subquadrate, the lateral tubercles strongly developed and subacute, the incisure at the base of the posterior coxæ and abdomen, black. Wings subhyaline, faintly tinged with fuscous; nervures and stigma pale fulvous; areolet large, 5-angular. Legs rufous, extreme tips of the posterior femora, apical half of their tibiæ and the basal and apical joints of their tarsi, black. Abdomen short, ovate, flattened above, shining at tip; basal segment longer than the second, strongly arcuated, flattened, broad at tip, somewhat bilineated; basal foveæ of the second segment rather large and deep; extreme apical segment obsoletely tinged with yellowish; ovipositor black, exserted about one line. Length 5 lines; expanse of wings 8½ lines.

Hab.—Virginia. Dr. Thos. B. Wilson.

Resembles *Ich. vicinus*, but is more robust, and is at once distinguished from that species by the prominent tubercles on the metathorax.

52. **Ich. annulipes**, n. sp.

Rufous, the thorax blackish; antennæ with a white annulus; scutellum yellow; wings clear; central area of metathorax obsolete; tibiæ with a yellow band.

Female.—Yellowish-rufous, finely punctured, shining; palpi pale yellowish; antennæ half the length of the body, involute, blackish, the 9th to 14th joints white, basal joint robust, rufous. Thorax blackish, the disk of the mesothorax and a sutural line before the wings rufous; tegulæ and a short line beneath the wings yellowish; scutellum flat, polished, yellow, with a transverse yellow spot behind it; metathorax densely punctured, deeply impressed behind, black, the posterior angles rufous, the elevated lines and central area obsolete, the latter almost entirely so. Wings hyaline, very faintly tinged with fuliginous, iridescent; nervures and stigma fuscous, the latter paler; areolet 5-angular. Legs yellowish-rufous; trochanters and band on the tibiæ, subobsolete on the two anterior pairs and very distinct on the posterior pair, yellow; posterior coxæ, femora and base and apex of their tibiæ, piceous. Abdomen subovate, shining, pale rufous; basal segment rather broad, bilineated, basal foveæ of the 2nd segment obsolete; apical segments smooth and polished, the last segment with a yellowish tinge; ovipositor not exserted. Length 3½ lines; expanse of wings 6 lines.

Hab.—Delaware. Dr. T. B. Wilson.

53. **Ich. pusillus**, n. sp.

Yellowish-rufous, the thorax partly blackish; antennæ with a white annulus; scutellum and subobsolete bands on tibiæ, yellowish; wings clear; central area of metathorax obsolete.

Female.—Yellowish-rufous, rather slender, shining; antennæ more than half the length of the body, involute, rufo-piceous, the 9th to 15th joints white, basal joint robust, rufous. Thorax pale rufous above, blackish beneath; scutellum flat, polished, yellow, with a rufous spot behind; metathorax densely punctured, blackish, rufous behind, the elevated lines and central area obsolete. Wings hyaline, iridescent; nervures and stigma fuscous, the latter paler; areolet 5-angular. Legs yellowish-rufous, all the tibiæ with a subobsolete yellow band, more obvious on the posterior pair. Abdomen elongate-subovate, polished, yellowish-rufous, the last segment tinged with yellow; ovipositor not exserted. Length 2½ lines; expanse of wings 4½ lines.

Hab.—Delaware. Dr. T. B. Wilson.

Closely allied to *Ich. annulipes*, but is smaller, much less robust, and paler in color, with the antennæ rather longer.

54. **Ich. longulus**, n. sp.

Yellowish-ferruginous; face and scutellum, yellow; incisures of abdomen above black; wings subhyaline; central area of metathorax rather large, quadrate.

Male.—Yellowish-ferruginous, subopaque; face beneath the antennæ, clypeus, labrum, mandibles and lower part of the cheeks, yellow; antennæ porrect, half as long as the body, black, basal joint yellowish-ferruginous, paler beneath. Thorax polished, sparsely punctured; metathorax slightly stained with fuscous; tegulæ, a sutural line before and a short line beneath the wings, yellowish; scutellum rather convex, yellow, polished, the space on each side blackish; metathorax indistinctly punctured, opaque, the elevated lines indistinct, central area rather large, quadrate, not well defined. Wings fusco-hyaline, with a slight violaceous reflection; nervures fuscous, testaceous at base, stigma fulvous; areolet 5-angular. Legs yellowish-ferruginous varied with yellow; tips of posterior tibiæ blackish. Abdomen very elongate, rather slender; basal segment distinctly bilineated and finely aciculate; basal foveæ of the second segment deep and oblique; the third and three following segments each with a narrow black fascia at base above; apical segments smoother; beneath yellowish-ferruginous, the middle of the segments stained with yellowish. Length 7 lines; expanse of wing 10 lines.

Hab.—Rocky Mountains, Colorado Territory.

Resembles *Ich. propinquus*, but the color is paler, the form much more elongate and slender, and the antennæ almost entirely black. It is possible, however, that it may be the male of that species.

55. **Ich. propinquus,** n. sp.

Reddish-fulvous; apical half of antennæ, sutures of the thorax and the basal margin of 2nd, 3rd and 4th abdominal segments, black; wings fusco-hyaline; central area of metathorax moderate, quadrate, rather transverse.

Female.—Bright reddish-fulvous, shining, very minutely punctured; antennæ half the length of the body, involute, apical half blackish. Thorax: the mesothorax shining; a line on the collar above, the sutures of the pleura and the spaces on each side of the scutellum, black; scutellum slightly convex, polished, tinged with yellowish; metathorax finely punctured, the elevated lines tolerably distinct, the central area moderate, quadrate, slightly transverse. Wings fusco-hyaline, with a slight yellowish tinge; nervures fuscous, pale at base, stigma fulvous; areolet 5-angular. Legs bright fulvous, polished, basal sutures of the coxæ blackish. Abdomen elongate-subovate, rather robust; basal segment distinctly bilineated, finely aciculate; basal foveæ of the 2nd segment small, black, as well as the margin between them; 3rd and 4th segments with a narrow black band at base; apical segments smooth and polished; beneath tinged with yellowish; ovipositor not exserted. Length 6½ lines; expanse of wings 11 lines.

Hab.—Rocky Mountains, Colorado Territory.

Closely resembles *Ich. suturalis* Say, but is at once distinguished from that species by the slightly transverse subquadrate central area of the metathorax. I have before me numerous specimens of *suturalis* from Mass., N. Y., N. J., Penn., Del., Va., and Illinois, and all of them have the central area large and elongate; they vary in the black sutural bands of the abdomen being sometimes indistinct, and at other times broad, especially that on the 4th segment.

56. **Ich. subfuscus**, n. sp.

Reddish-brown; face, basal half of antennæ, and scutellum tinged with yellowish; apical half of antennæ, sutures of thorax, and base of 2nd and 3rd abdominal segments, blackish; wings fusco-hyaline; central area of metathorax large, elongate.

Female.—Reddish-brown; the face and frontal orbits tinged with yellowish; antennæ two-thirds the length of the body, slender, the basal half pale rufous, the remainder black. Thorax finely and indistinctly punctured, the mesothorax polished, the pleura indistinctly aciculate; all the sutures, except those in front of the wings, blackish; scutellum flat, polished, tinged with yellowish, the space on each side, including the postscutellum, blackish; metathorax densely and finely punctured, the elevated lines well defined, the central area large and elongate. Wings long, fusco-hyaline; nervures fuscous, testaceous at base, stigma fulvous; areolet 5-angular. Legs rufo-fuscous, the posterior tibiæ at tip blackish. Abdomen rather short, robust, shining, very minutely punctured; first segment rather broad, bilineated and finely aciculate, petiole moderate, blackish at base; basal foveæ of the 2nd segment small, slightly impressed, coarsely aciculate and blackish; base of the 3rd and 4th segments above with a blackish band not reaching the lateral margins, that on the 4th segment occupies almost the basal half and is twice as broad as that on the 3rd segment; apical segments polished; beneath same color as above, the apical margins of the segments with a darker stain; ovipositor subexserted. Length 6 lines; expanse of wings 11½ lines.

Hab.—Rocky Mountains, Colorado Territory.

This species is allied to *Ich. suturalis* Say and *Ich. propinquus* n. sp.; from the former it differs by the darker color, the longer antennæ and wings, and the more robust form; from *propinquus* it differs by the darker color, the longer antennæ and in the shape of the central area of the metathorax.

57. **Ich. brevipennis**, n. sp.

Reddish-brown; sutures of thorax and abdomen blackish; wings short, subhyaline; central area of metathorax small, transversely subquadrate.

Female.—Reddish-brown, robust; antennæ darker towards the tip, involute, about half the length of the body. Thorax densely and finely punctured; the sutures beneath and on each side of the scutellum, blackish; scutellum flat, polished, tinged with yellowish; metathorax finely punctured, the elevated lines tolerably distinct, the central area rather small and transversely subquadrate. Wings short, subhyaline, slightly tinged with fuliginous, the posterior pair clear; nervures fuscous, stigma fulvous; areolet 5-angular or subtriangular. Legs stout, reddish-brown, the posterior tibiæ at tips and their tarsi obfuscated. Abdomen rather short, robust; basal segment broad, finely aciculate; basal foveæ of the 2nd segment transverse, indistinctly impressed; basal margin of the 2nd, 3rd and 4th segments above, narrowly black; the basal and two or three apical segments paler in color than the rest; ovipositor reddish, exserted about 1½ lines. Length 5½ lines; expanse of wings 7½ lines.

Hab.—Rocky Mountains, Colorado Territory.

In color, this species resembles *Ich. subfuscus*, but is readily distinguished by its much shorter wings.

58. **Ich. sandix**, n. sp.

Yellowish-rufous, thorax beneath blackish, antennæ tricolored; wings dark fuscous; central area of metathorax moderate, subquadrate.

Female.—Dull yellowish-rufous, rather shining, feebly punctured; antennæ two-thirds as long as the body, slightly involute at tip, basal joints pale rufous, the middle yellowish, the apical joints blackish. Thorax above rufous, beneath black; pleura with a rufous spot, tegulæ and scutellum rufous, the latter flat and polished, the space on each side blackish; metathorax rufous above, black beneath, densely and rather roughly punctured, profoundly impressed behind, the elevated lines well defined, the central area moderate transversely subquadrate, not well defined. Wings dark fuscous, with a strong æneous reflection; nervures black, stigma brown; areolet 5-angular. Legs rufo-fulvous, coxæ black, the posterior pair tinged with rufous behind. Abdomen rather short, ovate, subdepressed, basal segment broad, bilineated and slightly aciculate, peduncle slender; basal foveæ of the second segment small, subobsolete, apical segments slightly obfuscated; ovipositor not exserted. Length 6 lines; expanse of wings 11½ lines.

Hab.—New York. Mr. James Angus.

59. Ich.? trogiformis, n. sp

Dull rufous, thorax beneath and metathorax blackish; antennæ finely subserrate, with a yellowish annulus; wings blackish-violaceous; segments of the abdomen strongly contracted at incisures.

Male.—Head large, transverse, subquadrate, slightly broader than the thorax, rufous, paler in front, feebly punctured, shining; clypeus polished; mandibles with a yellowish spot; antennæ more than half the length of the body, porrect, finely subserrate, black above, brown beneath, the four basal joints rufous, the 14th to 20th joints yellow, apical joints gradually attenuated. Thorax densely, deeply and confluently punctured, the mesothorax and a large irregular stain on the pleura, rufous; remainder of the pleura and the metathorax black, the latter sometimes tinged with rufous; the collar and scutellum tinged with yellowish, the latter rather convex; metathorax scabrous, the elevated lines obsoletely defined, the central area small, elongate, subobsolete. Wings ample, blackish-violaceous; nervures and stigma black, the latter with a pale spot at base; areolet 5-angular, rather oblique, the 2nd recurrent nervure with a process in the middle. Legs moderately long and slender, pale rufous, the tibiæ and tarsi tinged with yellowish; posterior coxæ black, their femora obfuscated. Abdomen elongate, not broad, the apex incurved, densely and profoundly punctured; the segments strongly contracted at the incisures as in the genus *Trogus;* rufous; basal segment not much dilated, subconvex, deeply punctured, with a depression on each side at tip, petiole rather short and stout, blackish; basal foveæ of the 2nd segment small, rather deep; the apical segments have the punctures gradually finer, and the last two are smooth, shining and yellowish-sericeous; beneath tinged with yellowish. Length 6 lines; expanse of wings 10 lines.

Hab.—New Jersey. E. T. Cresson.

This singular insect probably does not belong to this genus; in general appearance it resembles that of *Trogus*, but the head is much larger, the antennæ are shorter and subserrate, the areolet of the wings differently shaped, the scutellum not elevated, and the abdomen not so broad. The structure does not satisfactorily agree with that given of

Pristiceros, the principal character of which seems to be the serrate antennæ.

60. **Ich. rubicundus**, n. sp.

Pale rufous; antennæ with a whitish annulus; wings subhyaline; central area of metathorax moderate, subquadrate.

Female.—Entirely pale rufous, densely punctured, subopaque; face short; antennæ rather short, rufous at base, whitish in the middle and piceous at tip; scutellum slightly convex, polished; metathorax shining, finely punctured, the elevated lines tolerably well defined, the central area moderate, elongate-subquadrate, polished. Wings subhyaline, the anterior pair rather strongly fuliginous, posterior pair paler and iridescent; nervures and stigma blackish, the latter whitish at base; areolet 5-angular, the 2nd recurrent nervure angulated. Legs color of the body, the tarsi obfuscated, tips of the posterior femora and tibiæ sometimes blackish. Abdomen rather stout, densely punctured; basal segment rather broad, indistinctly bilineated and finely aciculate; basal foveæ of the 2nd segment obsolete; apical segments darker, smooth and polished; ovipositor not exserted. Length 3¼ lines; expanse of wings 5½ lines.

Hab.—Illinois. Dr. Samuel Lewis.

61. **Ich. lævigatus**, n. sp.

Rufo-ferruginous, shining; antennæ with a broad yellowish annulus: wings clear; central area of metathorax large, irregularly subquadrate.

Female.—Entirely rufo-ferruginous, smooth and shining; face beneath the antennæ tinged with yellowish; antennæ short, slightly involute, basal joint rufous, 2nd to 7th piceous, 8th to 13th yellow, remaining joints blackish above, rufo-piceous beneath. Thorax finely punctured, somewhat flattened on the disk above; scutellum flat, polished, slightly tinged with yellowish; metathorax somewhat roughly punctured, subopaque, the elevated lines well defined, the central area large, irregular, slightly transverse. Wings almost hyaline, very faintly tinged with fuliginous; nervures blackish, fuscous at base, stigma rather large, black; areolet 5-angular. Legs short and rather stout, color of the body, clothed with very short yellowish pubescence. Abdomen rather short, stout, smooth and polished; basal segment not much dilated, rather convex, minutely and obsoletely aciculate, lateral margins carinated, deeply incised at tip; basal foveæ of the second segment very transverse and rather deeply impressed; incisures of the segments somewhat fuscous; ovipositor not exserted. Length 4 lines; expanse of wings 6 lines.

Hab.—Rocky Mountains, Colorado Territory.

62. **Ich. dorsalis**, n. sp.

Black; middle of face, mesothorax, scutellum and abdomen, rufous; wings dark fuscous; central area of metathorax large, transversely subquadrate.

Female.—Head black, shining, middle of the face, clypeus, mandibles, narrow frontal orbits, and the vertex and occiput, rufous; antennæ as long as the thorax, involute, brown, beautifully golden-sericeous, blackish towards the base, basal joint robust, black, shining. Thorax black, the whole of the mesothorax above and the scutellum rufous, the latter slightly convex, depressed and flattened in front and connected with the mesothorax on each side by a sharp carina; postscutellum with an obsolete rufous spot; metathorax scabrous, opaque black, the elevated lines sharply defined, the central area large, transversely subquadrate, the posterior margin bent inwards. Wings fuscous, with a violaceous reflection; nervures black, the stigma rufous at base; areolet 5-angular. Legs shining black, the extreme base and apex of the femora, and the tibiæ and tarsi, rufous, the tibiæ varied with rufo-piceous. Abdomen short, robust, rufous, the petiole rather slender, black; first segment bilineated and finely aciculate; basal foveæ of the second segment transverse, rather deep, this and the third segment above subopaque, very densely punctured, the remaining segments shining, the punctures less distinct; beneath, the segments, excepting the first, are rufous with their middle obfuscated. Length 6 lines; expanse of wings 11½ lines.

Hab.—Rocky Mountains, Colorado Territory.

63. **Ich. Lewisii**, n. sp.

Cinnamon-brown; the pleura, metathorax, coxæ and the first and base of third segments of abdomen black; antennæ tricolored; wings dark fuscous; central area of metathorax large and subquadrate.

Female.—Head cinnamon-brown, palpi paler; antennæ more than half the length of the body, slightly involute, basal joint pale rufous, gradually shading into pale yellow, which color extends to the 18th joint, beyond which the joints are blackish above and dull rufous beneath. Thorax black, the mesothorax above, as well as the scutellum, dark brown, the latter polished, slightly convex and impressed anteriorly; metathorax scabrous, black, elevated lines not well defined, the central area large, subquadrate and somewhat transverse. Wings dark fuscous with a strong violaceous reflection; costa and stigma except tip fulvous, nervures blackish; areolet 5-angular. Legs pale brown, the coxæ and trochanters black. Abdomen ovate, rather short and broad, cinnamon-brown, subopaque; basal segment broad, very much dilated, confluently punctured and having a tubercle on each side; peduncle slender; basal foveæ of second segment shallow; apical segments smoother and pilose; beneath, the second and following segments are cinnamon-brown, obfuscated on their middle; ovipositor not exserted. Length 6½ lines; expanse of wings 11½ lines.

Hab.—Illinois. Dr. Samuel Lewis.

The following species also seem to belong to this Section:—*Ich. suturalis* Say, *Ich. Lariæ* Curtis, *Ich. ferrugator* Kirby, *Ich. duplicatus* Say, *Ich. residuus* Say, *Ich. hilaris* Say, *Ich. bifasciatus* Say and *Ich. pennator* Fab., all of which are unknown to me except the first.

SECTION 8.

64. Ich. regnatrix, n. sp.

Large, black; antennæ with a white annulus; wings blackish; central area of metathorax small, elongate, conical; abdomen exceptiug basal segment rufous.

Female.—Black, subopaque, thinly clothed with short black pubescence. Head entirely black, sometimes the frontal orbits above the antennæ are narrowly white; clypeus shining, with a deep, rounded fovea on each side; antennæ short, black, the apical half involute, flattened towards the tip, the 10th to 16th joints above white, beyond this the joints beneath are sometimes tinged with rufous. Thorax closely punctured, the mesothorax in front with an impressed line on each side not reaching the disk; scutellum black, convex, punctured, shining; metathorax densely and confluently punctured, somewhat scabrous, opaque, the elevated lines well defined, central area small, conical, elongate. Wings blackish-fuscous, with a rather strong violaceous reflection; nervures and stigma black, the latter with a pale spot at base; areolet 5-angular, slightly oblique. Legs black, the anterior tibiæ whitish in front. Abdomen elongate-subovate, minutely punctured, opaque rufous, the segments strongly incised and compressed at the sutures as in the genus *Trogus;* basal segment black, broad at the apex, bilineated, confluently punctured; basal foveæ of the second segment very deep, transverse, slightly oblique and strongly aciculate; the two apical segments clothed above with rufous pubescence, as well as the ventral segments which are also rufous, shining. Length 11—12 lines; expanse of wings 17—19 lines

Hab.—Penn., Del., Va. Dr. T. B. Wilson.

A fine, large species, probably the same as Say's variety of his *Ich. devinctor* with black scutellum and legs, but in that species the scutellum is flat, the central area of the metathorax is large and subquadrate, the abdomen more smoothly and finely punctured and the segments not contracted at their sutures as in *regnatrix.*

This species seems very close to *Ich. grandis* Brullé, but among a dozen individuals I cannot find one with a yellow spot on the scutellum, as is mentioned by Brullé.

Ich. tibialis Brullé seems to be identical with *Ich. devinctor* Say.

65. **Ich. semicoccineus,** n. sp.

Black, face yellow, wings dark fuscous, abdomen bright rufous, central area of metathorax moderate, transverse.

Male.—Head black, the face beneath the antennæ, narrow frontal orbits, clypeus, a spot on mandibles and the palpi yellow, the face with a large black spot on its middle, sometimes reduced to a mere dot; antennæ porrect, more than half the length of the body, black, brownish beneath towards the tip, basal joint beneath yellow. Thorax black, shining, finely and sparsely punctured; scutellum slightly convex, polished, black, deeply impressed in front; metathorax somewhat scabrous, the elevated lines well defined, the central area transverse, moderate, its margin smooth and shining. Wings blackish-fuscous, with a strong æneous reflection; nervures and stigma black, the latter with a pale spot at base; areolet 5-angular, slightly oblique. Legs black, the anterior and intermediate tibiæ yellowish in front. Abdomen elongate, sublinear, bright rufous, opaque, the segments strongly incised; the basal segment black, slender, rather broad at tip, bilineated; basal foveæ of the second segment deep; beneath, the segments are yellowish-ferruginous. Length 8 lines; expanse of wings 12½ lines.

Hab.—Delaware and Virginia. Dr. Thos. B. Wilson.

66. **Ich. californicus**, n. sp.

Black, the legs and abdomen brown; wings dark fuscous, with a violet reflection; central area of metathorax narrow, transverse.

Male.—Black, subopaque; clypeus polished, mandibles and palpi piceous; antennæ porrect, more than half the length of the body, black, tinged with piceous beneath. Thorax finely punctured; scutellum convex, shining; metathorax confluently punctured, the elevated lines well defined, the central area narrow, transverse. Wings dark fuscous, with a violaceous reflection; nervures and stigma black, areolet 5-angular. Legs brown, shining, the anterior pair paler in front, the coxæ and posterior tarsi black. Abdomen elongate, compressed, opaque dark brown, densely punctured; basal segment black, bilineated and finely aciculate; basal foveæ of second segment deep, transverse and oblique, near the tip of this segment is a triangular impression; apical segments smoother and somewhat shining; beneath pale brown. Length 7 lines; expanse of wings 11 lines.

Hab.—California. Dr. Geo. H. Horn.

67. **Ich. incertus**, n. sp.

Black; antennæ with a whitish annulus; legs and abdomen rufous; wings violaceous-black; central area of metathorax transversely subquadrate.

Female.—Head and thorax black, finely and densely punctured, shining; clypeus polished, with a deeply impressed fovea on each side and a slight one on its middle; antennæ more than half the length of the body, porrect, 11th to 15th joints white, tinged with ferruginous exteriorly, apical joints beneath rufous. Thorax with an impressed line on each side of the disk anteriorly; tegulæ black; scutellum convex, polished, black; postscutellum with two deep punctures; metathorax densely and rather roughly punctured, the elevated lines tolerably well defined, the central area moderate, transversely subquadrate. Wings ample, blackish-fuscous, with a deep violaceous reflection; nervures and stigma black, the latter with a pale spot at base; areolet 5-angular, with 5 small hyaline spots on each side and 3 below. Legs rufous, the coxæ and trochanters black, the four posterior tarsi piceous. Abdomen robust, subovate, shining, rufous, petiole black; basal segment broad, bilineated and finely aciculate; basal foveæ of the second segment deep and oblique; apical segments polished; ovipositor not exserted. Length 6½ lines; expanse of wings 12 lines.

Hab.—New Jersey. E. T. Cresson.

Closely resembles *Ich. rufiventris* Brullé, of which it may be a variety, but the annulus of the antennæ is larger, the central area of metathorax is smaller and less quadrate, and the legs and the basal segment of the abdomen are rufous instead of black. The size and general appearance is much the same in both species.

68. **Ich. virginicus**, n. sp.

Black; antennæ with a white annulus; abdomen rufous; wings hyaline; central area of metathorax small, conical, polished.

Female.—Head large, black, face short, densely punctured, clothed with pale pubescence, prominent in the middle, with a small tubercle beneath the insertion of each antenna; frontal orbits, interrupted on each side of the antennæ, yellowish; clypeus short and very transverse, with a deep fovea on each side, apical margin depressed, smooth and tinged with rufo-piceous; mandibles large, black, polished; palpi yellowish-white; antennæ short, involute, black, 7th to 18th joints above white, apical joints beneath tinged with rufous, basal joint very robust, remaining joints short, submoniliform. Thorax black, shining, closely punctured, clothed with a very fine pale glittering pubescence; tegulæ piceous, before which there is a short, narrow white line; scutellum black, rather flat, densely punctured; metathorax black, densely and strongly punctured, the elevated lines well defined, the central area rather small, subconical, smooth and polished. Wings clear, nervures and stigma black, areolet 5-angular or subtriangular, rather oblique, the 2nd recurrent nervure angular. Legs short and stout, black, the tibiæ and tarsi piceous, clothed with very short, sparse, yellowish pubescence; femora short and thick. Abdomen short, subovate, slender at base, finely punctured, shining, rufous, the petiole blackish; basal segment bilineated, densely and rather deeply punctured; basal foveæ of the second segment small, not deep; apical segments polished; ovipositor not exserted. Length 6 lines; expanse of wings 10 lines.

Hab.—Virginia. Dr. Thos. B. Wilson.

This may be identical with *Ich. detritus* Brullé, but is rather doubtful. It is however distinct from any other species known to me.

69. **Ich. Syphax**, n. sp.

Black, glossy; antennæ involute, with a whitish annulus; wings subhyaline; abdomen ferruginous; central area of metathorax large, quadrate.

Female.—Head and thorax black, shining, closely punctured; clypeus with a deep fovea on each side; antennæ black, slender, involute, the 9th to 14th joints whitish above; scutellum slightly convex, black, polished, impunctured; metathorax finely scabrous, opaque, the elevated lines well defined, the central area large, quadrate and slightly transverse. Wings subhyaline, slightly stained with fuscous; nervures and stigma black, the latter with a pale spot at base; areolet 5-angular. Legs black, shining; the anterior tibiæ and tarsi in front, pale. Abdomen elongate-ovate, ferruginous, convex above especially towards the apex which is polished; basal segment black, rather broad, bilineated and minutely punctured, petiole slender. Length 7½ lines; expanse of wings 11 lines.

Hab.—Delaware. Dr. Thos. B. Wilson.

70. **Ich. limbifrons**, n. sp.

Black; lateral margins of the face white; legs and abdomen, except base and apex, rufous; wings subhyaline; central area of metathorax moderate, subconical.

Male.—Black, finely punctured; lateral margins of the face and a spot on each side of the clypeus, white; antennæ more than half the length of the body, porrect, entirely opaque black. Thorax and scutellum entirely black, somewhat shining, the latter slightly convex; metathorax finely punctured, shining, the elevated lines well defined, the central area moderate, subconical, rounded in front, indented behind. Wings subhyaline, tinged with fuliginous and iridescent; nervures and stigma black; areolet subtriangular. Legs rufous, the anterior pair yellowish, the coxæ and trochanters black, the tarsi obfuscated. Abdomen elongate, rather slender, shining, rufous, the petiole, disk of the 5th and the two apical segments, black; basal segment not much dilated, indistinctly bilineated, punctured; basal foveæ of the 2nd segment deep and oblique; beneath colored same as above. Length 4 lines; expanse of wings 5¾ lines.

Hab.—Rocky Mountains, Colorado Territory.

71. **Ich. exiguus**, n. sp.

Black, polished; abdomen and legs rufous; wings hyaline; central area of metathorax small, lunate.

Female.—Black, polished, indistinctly punctured; face short, slightly pubescent; mandibles mostly rufous; antennæ short, piceous, basal joint beneath rufous. Thorax smooth and polished; scutellum rather flat;

metathorax finely punctured, the elevated lines well defined, the central area very small, lunate. Wings hyaline, iridescent; nervures and stigma black; areolet 5-angular. Legs rufous; posterior coxæ black. Abdomen short and stout, subovate, smooth and polished, rufous; basal segment broad, obsoletely aciculate; basal foveæ of the 2nd segment obsolete; ovipositor not exerted. Length 2½ lines; expanse of wings 4½ lines.

Hab.—Rocky Mountains, Colorado Territory.

72. **Ich. rufizonatus**, n. sp.

Black; antennæ with a narrow white annulus; wings subhyaline; second and third segments of abdomen ferruginous; central area of metathorax large and quadrate.

Female.—Black, shining; clypeus polished, with a deep fovea on each side; antennæ about half the length of the body, black, sericeous beneath, the 9th to 12th joints white above. Thorax closely punctured; scutellum slightly convex, punctured; metathorax finely scabrous, the elevated lines well defined, the central area large, quadrate, slightly elongate. Wings subhyaline, slightly stained with fuliginous, and having a faint metallic reflection; nervures and stigma black; areolet 5-angular. Legs black, the anterior tibiæ and tarsi in front whitish. Abdomen elongate-ovate, black, convex above and polished towards the apex; basal segment bilineated, minutely punctured, petiole slender; second and third segments ferruginous above and beneath. Length 7 lines; expanse of wings 11 lines.

Hab.—New Jersey. E. T. Cresson.

73. **Ich. involutus**, n. sp.

Black, polished; antennæ strongly involute, legs and the 2nd and 3rd segments of the abdomen rufous; wings fuliginous; central area of metathorax large, quadrate, polished.

Female.—Black, polished, finely punctured; face short; clypeus very transverse, with a large deep puncture on each side; mandibles rufous, cheeks with scattering puncturns; antennæ short, strongly involute, black, apical two-thirds tinged with rufous, and densely clothed with yellowish-sericeous pubescence, basal joint robust, globose, rufous beneath. Thorax closely and finely punctured, indistinctly so on the disk above which is polished; scutellum rather flat, polished; metathorax densely punctured, subopaque, the elevated lines not well defined, the central area large, quadrate, polished. Wings fuliginous; nervures and stigma black; areolet 5-angular or subtriangular. Legs yellowish rufous, the coxæ tinged with piceous, the tarsi obfuscated at tips. Abdomen stout, subovate, polished, finely and uniformly punctured, indistinctly so at tip; basal segment rather broad at tip, bilineated, black, its extreme apical margin rufous, as well as the whole of the 2nd and 3rd segments except the apical margin of the latter which is blackish; remaining segments black; basal foveæ of the 2nd segment obsolete; beneath as above; ovipositor not exserted. Length 4 lines; expanse of wings 6 lines.

Hab.—Rocky Mountains, Colorado Territory.

Ich. rufiventris Brullé and *Ich. detritus* Brullé also belong to this Section, the last of which is unknown to me.

Section 9.

74. **Ich. terminalis**, n. sp.

Rufous, head, mesothorax, pleura and apical segments, except a white spot at tip, blackish; antennæ with a white annulus; scutellum yellow; wings clear; central area of metathorax moderate, subquadrate.

Female.—Head blackish, palpi pale; antennæ about half the length of the body, slightly involute, the basal joints somewhat rufous, the 9th to 14th joints pure white, the apical joints brown-black. Thorax minutely punctured, black, with a large rufous stain on the pleura; tegulæ pale rufous; scutellum flat, polished, pale yellow; metathorax densely punctured, entirely pale rufous, the elevated lines tolerably well defined, the central area subquadrate. Wings hyaline, iridescent; nervures fuscous, stigma pale; areolet 5-angular or subtriangular, the 2nd recurrent nervure sinuate. Legs pale rufous, tips of the posterior femora and tibiæ blackish, their tarsi obfuscated. Abdomen stout, subovate, pale rufous; petiole slender; basal segment bilineated, polished; 2nd and 3rd segments finely and densely punctured, the basal foveæ of the former obsolete; apical segments smooth and polished; the 4th, except its basal margin, and the remaining segments black; a small spot on the middle of the 6th and the whole of the 7th above, pure white; ovipositor not exserted. Length 3½ lines; expanse of wings 5½ lines.

Hab.—Delaware. Dr. Thos. B. Wilson.

75. Ich. soror, n. sp.

Yellowish-rufous; antennæ with a white annulus; scutellum, the four anterior coxæ and a spot on apical segment of abdomen yellowish; wings clear; central area of metathorax moderate, subrotundate.

Female.—Yellowish-rufous, shining; antennæ short, blackish, the 9th to 15th joints white, basal joint beneath rufous. Thorax above slightly tinged with fuscous; tegulæ and a short line beneath the wings, surrounded by a blackish spot, yellowish; scutellum flat, polished, yellowish, with a subobsolete pale spot behind, space on each side blackish; metathorax finely punctured, the elevated lines not well defined, the central area moderate, subrotundate, polished. Wings hyaline, very faintly fuliginous, iridescent; nervures and stigma fuscous, the latter pale at base; areolet 5-angular or subtriangular, the 2nd recurrent nervure sinuate. Legs pale rufous, the four anterior coxæ yellow, the tips of the posterior femora and tibiæ, and their tarsi, blackish. Abdomen robust, subovate, shining; basal segment rather broad, bilineated, polished; 2nd and 3rd segments finely punctured, apical segments polished; last segment above yellow; beneath tinged with yellow; ovipositor not exserted. Length 3 lines; expanse of wings 5 lines.

Hab.—Delaware. Dr. T. B. Wilson.

76. Ich. velox, n. sp.

Reddish-brown: antennæ with a broad white annulus; thorax beneath blackish: wings hyaline; central area of metathorax large, quadrate; apical segment of abdomen with a yellow spot.

Female.—Reddish-brown; clypeus and occiput blackish; antennæ about half the length of the body, black, tip slightly involute, the 9th to 16th joints white. Thorax black; mesothorax above brown, as well as the tegulæ, a spot beneath the wings, the scutellum and the anterior margin of the metathorax; scutellum flat, punctured, shining; metathorax finely punctured, the elevated lines well defined, the central area large, quadrate. Wings long, ample, hyaline; nervures fuscous, stigma paler; areolet 5-angular or subtriangular. Legs reddish-brown, the intermediate and posterior femora in part black, the latter almost entirely so. Abdomen elongate-ovate, reddish-brown, subopaque, shining at tip; basal foveæ of the second segment transverse; apical segment with a large yellow spot above; beneath brownish. Length 5 lines; expanse of wings 9 lines.

Hab.—Illinois. Dr. Samuel Lewis.

This species belongs to this Section, and was accidentally omitted in the Table given on page 135; the scutellum and last abdominal segment differs in color from that stated in the Table, which should therefore be amended to read as follows:—

Section 9.—Scutellum yellow or red; abdomen red or red and black, apex white or yellow..Sp. 74—76

Genus ISCHNUS, Grav.

Under this genus, I have placed those species which only differ from *Ichneumon*, in the basal segment of the abdomen being smooth and polished, while those of the latter genus have that segment more or less rugged.

1. **Isch. jejunus**, n. sp.

Black; face, two lines or a spot on mesothorax, and scutellum, white; wings subhyaline; central area of metathorax small, slightly elongate.

Male.—Black; the face beneath the antennæ, orbits, clypeus, spot on mandibles and the palpi, white; antennæ porrect, more than half the length of the body, black, basal joint beneath white. Thorax closely punctured; the tegulæ, a sutural line before and a short line beneath the wings, and two lines or a spot on the disk of mesothorax, white; scutellum flat, punctured, white; metathorax confluently punctured, the elevated lines well defined, the central area small, subconical, rather elongate. Wings subhyaline, slightly tinged with fuscous; nervures and stigma black; areolet 5-angular. Legs black, the two anterior pairs in front, their coxæ beneath, and the base of the posterior tibiæ exteriorly, whitish. Abdomen long and slender, subcylindrical, finely punctured, black with a slight bluish tinge; peduncle slender, the tip of the basal segment only slightly dilated, subconvex, rather smooth and shining; basal foveæ of the second segment small and deep; apical segments smooth and shining. Length 7 lines; expanse of wings 11 lines.

Hab.—Illinois (Dr. Saml. Lewis); Massachusetts (F. G. Sanborn).

2. **Isch. sublatus**, n. sp.

Black; face, scutellum, two spots on metathorax and the four anterior legs, white; wings hyaline; central area of metathorax small, rotundate or slightly subquadrate.

Male.—Head black, the face, orbits very wide on the cheeks, clypeus, mandibles and palpi, white; antennæ porrect, almost as long as the body, black, the basal joint beneath white. Thorax black; a spot on the disk of mesothorax, the tegulæ, a sutural line before and a short line beneath the anterior wings, a spot beneath the posterior wings, and the collar above, white; scutellum flat, whitish, with a short transverse whitish line behind it; metathorax somewhat finely punctured, shining. a rather large whitish spot on each side behind, the elevated lines well defined, the central area small, rotundate or slightly subquadrate. Wings hyaline, faintly fuliginous at tips; nervures and stigma black; areolet 5-angular. Legs black; the anterior pair, excepting the femora behind, the intermediate pair with the coxæ beneath, the trochanters, the tarsi, and the femora and tibiæ exteriorly, white; the basal half of the posterior tibiæ and tarsi at base, also white. Abdomen elongate, subcylindrical, slender, black, immaculate, minutely punctured, shining; basal segments slender, subconvex, rather smooth; basal foveæ of the second segment small, not deep; beneath black. Length 7 lines; expanse of wings 11½ lines.

Hab.—Illinois (Dr. Saml. Lewis); Virginia (Dr. T. B. Wilson).

Same form as *Isch. jejunus*, but that species has the antennæ shorter and the metathorax immaculate.

3. **Isch. proximus**, n. sp.

Black: antennæ with a broad white annulus; face, scutellum, two short lines on mesothorax, two spots on metathorax and the anterior legs in part, white; wings hyaline; central area of metathorax small, quadrate.

Male.—Head black; the face beneath the antennæ, broad orbits, clypeus, spot on mandibles, and the palpi, white; antennæ porrect, three-fourths the length of the body, the 17th to 23rd joints, and the basal joint beneath, white. Thorax black, shining, sparsely punctured above, closely beneath; mesothorax with the dorsal lines well impressed; tegulæ, a broad sutural line before and a short one beneath the wings, the collar above and two short lines on the disk of mesothorax, white; scutellum rather flat, smooth and shining, white, as well as a transverse spot behind it; metathorax confluently punctured, black, with two white spots behind, the elevated lines tolerably well defined, the central area small and subquadrate. Wings hyaline; nervures and stigma black; areolet 5-angular. Legs black; anterior and middle pairs with their coxæ beneath, the trochanters, femora, tibiæ and tarsi in front, white, tips of tarsi blackish; posterior pair with their coxæ behind and the extreme two-thirds of their tibiæ, also white. Abdomen elongate, subcylindrical, black, densely and finely punctured; 1st segment convex above, smooth and polished, not much wider than the peduncle; foveæ of the 2nd segment small; apical segments gradually smoother and more shining; beneath black. Length 7 lines; expanse of wings 11½ lines.

Hab.—Pennsylvania. E. T. Cresson.

Resembles *Isch. sublatus*, and may prove to be a variety of it.

4. **Isch. Wilsoni**, n. sp.

Black; the face, scutellum, legs, and 2nd and 3rd abdominal segments yellow; wings subhyaline.

Male.—Head black; the face beneath the antennæ, orbits, interrupted behind near the summit and broad above base of mandibles, clypeus, mandibles except base and apex, and the palpi, yellow; antennæ slender, more than half the length of the body, porrect, blackish-brown above with a very narrow pale annulus in the middle, covering two or three joints, beneath pale fulvous, darker towards the apex; basal joint beneath yellow. Thorax black, shining, finely punctured, clothed with very short, fine, pale sericeous pubescence; tegulæ, a short sutural line before and another beneath the wings, yellow; scutellum rather convex, polished, yellow; metathorax black, finely punctured, the elevated lines sharply defined, the central area rather small, subquadrate, rather elongate. Wings subhyaline, slightly fuliginous; nervures fuscous, paler at base, stigma pale fulvous; areolet 5-angular. Legs yellow, the posterior coxæ, their femora and tips of their tibiæ black; apical joints of the tarsi often black. Abdomen elongate, subcylindrical, shining, black; basal segment narrow, convex, smooth and polished, petiole slender; on each side of the second segment at base a short longitudinal impressed line; apical segments polished; second and third segments yellow, their extreme apical margins black, somewhat dilated in the middle, apical half of the second segment often stained with pale ferruginous. Length 5—6 lines; expanse of wings 6½—8½ lines.

Hab.—Virginia. Dr. Thos. B. Wilson.

5. **Isch. Blandii**, n. sp.

Black; face, orbits, broad annulus on antennæ, lateral margins of thorax and scutellum, apical margins of abdominal segments, and tarsi, white; metathorax and legs in part, reddish; wings hyaline.

Male.—Head black, the face, orbits—broad on the cheeks,—clypeus, mandibles and palpi, white; antennæ nearly as long as the body, porrect, black, the 15th to 24th joints entirely, and the outer sides of the four following joints, white. Thorax black, finely punctured; sides of the pleura and most of the metathorax rufo-fulvous; a line on the collar extending down on each side, tegulæ, a sutural line before and a short one beneath the wings, two short dorsal lines, and a large patch on the pleura in front and beneath, white; scutellum rather flat, polished, black, the lateral and apical margins, the outer sides of the carina on each side of the scutellum in front, and the postscutellum, white; metathorax finely punctured, rufo-fulvous, the anterior portion above and a quadrate mark behind, blackish, the elevated lines well defined, the posterior ones yellowish, the central area rather large, subelongate. Wings hyaline, apical margins faintly smoky; nervures fuscous, the stigma paler; areolet subtriangular. Legs rufo-fulvous, the 4 anterior coxæ, the trochanters, anterior tibiæ in front and all the tarsi, more or less white; posterior tibiæ and tarsal claws, black. Abdomen elongate, subcylindrical, black, minutely punctured, shining; basal segment slightly dilated, subconvex, its sides, as well as most of the petiole, fulvous; basal foveæ of second segment small, and deep; apical margins of the first six segments and the whole of the seventh, except two black dots, white, the band on the third segment interrupted in the middle. Length 5 lines; expanse of wings 8 lines.

Hab.—Pennsylvania. Mr. Jas. H. B. Bland.

6. **Isch. vinnulus**, n. sp.

Black; antennæ with a yellowish annulus; face, orbits, lateral margins of mesothorax, a spot on its disk, tegulæ, most of pectus, scutellum, an ill defined W on metathorax and the coxæ, whitish; part of the 3rd, 4th and 5th, and all of the remaining segments of the abdomen, and the femora, fulvous; wings hyaline.

Male.—Head black, the face, clypeus, mandibles, orbits, broad on the cheeks, and the palpi, white; antennæ porrect, three-fourths as long as the body, black above, brown beneath, the 16th to 24th joints yellowish, the basal joint beneath whitish. Thorax black, shining, feebly punctured, a quadrate spot on the disk of the mesothorax, the tegulæ, a sutural line before and a short line beneath the fore-wings, extending down the suture and meeting the large spot which covers the pleura beneath, a line above the anterior coxæ, a spot beneath the hind wings and an angular line immediately behind it, all whitish;

scutellum slightly convex, smooth and polished, pale yellowish-white, as well as a spot behind it; metathorax black, densely punctured, rather shining, a large white mark on its posterior face, somewhat resembling an ill-defined W, elevated lines tolerably distinct, central area small, quadrate. Wings hyaline, slightly iridescent, the extreme tips faintly fuliginous; nervures fuscous, pale at base, stigma pale brown; areolet 5-angular or subtriangular. Legs: coxæ and trochanters whitish; the posterior coxæ exteriorly, extreme tips of their femora and the apical half of their tibiæ, black; the anterior legs before, the basal half of the posterior tibiæ and their tarsi, yellowish; remainder of the legs fulvous, much paler on the two anterior pair and deeper on the posterior femora. Abdomen elongate, subcylindric, very slender at base; basal segment not much dilated at tip, black, smooth and polished, its extreme apex with a whitish band; the 2nd and 3rd segments finely punctured, shining, the basal two-thirds of the 2nd, and the basal half of two following segments not reaching the lateral margins, black, remainder of the segments fulvous, tinged with yellowish on the 2nd and 3rd, the former having a fulvous dot on each side of the basal third; beneath paler, the black bands of the upper surface showing through. Length 6 lines; expanse of wings 10 lines.

Hab.—Pennsylvania. Mr. J. H. B. Bland.

7. **Isch. contiguus,** n. sp.

Black; antennæ with a yellowish annulus; clypeus, scutellum, a trilobed mark on metathorax, and the legs in part, yellowish; apical half of the 1st and 2nd abdominal segments, pale fulvous, remaining segments dull rufo-fulvous; wings hyaline.

Male.—Black, polished, clothed with a very short, fine, glittering pubescence; the clypeus, mandibles, palpi and the frontal orbits beneath the antennæ, broad beneath the eyes, yellowish-white; antennæ porrect, almost as long as the body, black, the 11th to 17th joints yellowish, the basal joint beneath whitish. Thorax glossy; the mesothorax with an impressed line on each side in front; the tegulæ, a spot before and a line beneath the wings, yellowish-white; scutellum slightly convex, polished, entirely yellowish-white, as well as a transverse spot behind, the carina on each side of the scutellum anteriorly is whitish behind; metathorax roughly punctured, black, with a large, transverse, trilobed, pale yellowish mark posteriorly, the middle lobe largest and almost reaching the postscutellum; the elevated lines and central area obsolete. Wings hyaline, with a faint yellowish gloss; nervures fuscous pale testaceous at base, stigma pale brown; areolet 5-angular. Legs: the two anterior pairs yellowish-fulvous; the anterior coxæ, the intermediate pair above and a double line on the posterior pair behind, whitish; the middle coxæ beneath, the posterior coxæ, their femora, except extreme base, and the apical third of their tibiæ, black; the four anterior tibiæ, the basal two-thirds of the posterior pair, and all the tarsi, pale yellowish. Abdomen elongate, subcylindrical, very slender at base, polished; basal segment with a small tubercle on each side before the apical third; basal two-thirds of the first segment and the basal half of the two following segments, black; apex of the first and apical half of the 2nd segments, pale fulvous; remaining segments dull rufo-fulvous. Length 5 lines; expanse of wings 9½ lines.

Hab.—Maryland. E. T. Cresson.

At first sight this species closely resembles *Isch. vinnulus*, but the markings of the head and thorax are differently arranged. They are certainly distinct.

8. **Isch. W-album**, n. sp.

Black; antennæ with a yellowish annulation; face, orbits, lateral margins of mesothorax and a spot on its disk, large spot on each side of pleura beneath, scutellum, W on metathorax and the coxæ, yellowish-white; abdomen, except 1st segment, and the femora pale fulvous; wings hyaline.

Male.—Head black; face, orbits, broad on the cheeks, clypeus, mandibles and palpi, yellowish-white; antennæ more than half the length of the body, porrect, black above, pale brown beneath, the 17th to 24th joints, and the basal joint beneath yellowish. Thorax black, shining, feebly punctured, the mesothorax impressed on each side in front; the collar above, a quadrate spot on the disk of the mesothorax, tegulæ, a sutural line before and a line beneath the fore wings, a large spot on each side of the pleura beneath, an oblique line on each side above the anterior coxæ and also a spot in front, a spot beneath each hind wing and another large transverse one behind, all yellowish-white; scutellum rather convex, polished, entirely pale yellow, as well as a transverse spot behind it; metathorax rather densely punctured, black, with a large, more or less distinct, W-shaped, yellowish-white mark, the elevated lines not well defined, the central area small and transverse.

Wings hyaline, faintly fuliginous at apical margins; nervures fuscous, pale at base, stigma pale brown; areolet 5-angular, slightly subtriangular. Legs pale fulvous; the coxæ except a large black spot on the outside of the posterior pair, whitish; the trochanters, the four anterior tibiæ in front and a band on the posterior tibiæ near their base, also whitish; extreme base of the posterior tibiæ as well as their apical half exteriorly, blackish. Abdomen elongate, subcylindric, slender at base, pale fulvous, darker towards the apex, shining, finely punctured; basal segment smooth and polished, black above and beneath, a triangular spot at its tip and its sides whitish; base of second segment depressed; beneath colored as above. Length 6 lines; expanse of wings 9 lines.

Hab.—Pennsylvania (C. A. Blake); Delaware (Dr. Wilson); New Jersey (Cresson).

9. **Isch. volens**, n. sp.

Yellowish-rufous; face, scutellum, two spots on metathorax, and the four anterior coxæ, yellowish; base of the 2nd and three following abdominal segments black; wings subhyaline.

Male.—Yellowish-rufous, shining, covered with a very short pale pubescence; the face beneath the antennæ, clypeus, spot on mandibles, palpi, and the outer orbits indistinctly, yellowish; the space immediately behind the base of the antennæ blackish; antennæ more than half the length of the body, porrect, yellowish-rufous, paler beneath, sometimes the 15th to 21st joints above are yellowish. Thorax dull rufous, sometimes brownish, finely punctured; the collar above, tegulæ, a spot before and a line beneath the wings yellowish; the pleura is stained with blackish along the sutures and beneath; scutellum rather convex, polished, as well as a short transverse line or two spots behind it, the space on each side is black; metathorax rather feebly punctured, shining, clothed behind with white pubescence, yellowish-rufous, its extreme sides black, and having two large yellowish spots behind, the elevated lines indistinct, the central area moderate, subquadrate, polished. Wings subhyaline, tinged with fuliginous; nervures fuscous, pale at base, stigma fulvous; areolet 5-angular or subtriangular. Legs yellowish-rufous; the four anterior coxæ and trochanters yellowish, the posterior tibiæ and tarsi obfuscated. Abdomen elongate, subcylindrical, slender at base, densely and finely punctured; basal segment smooth and polished; base of the 2nd and three following segments above with a black transverse mark, broadest on the 2nd and narrowest on 5th segment, the black color not reaching the lateral margins; remaining segments entirely yellowish-rufous; apical segments shining. Length 6½ lines; expanse of wings 10 lines.

Hab.—Virginia (Dr. Wilson); Illinois (Dr. Lewis).

10. **Isch. scitulus**, n. sp.

Blackish: face, orbits, annulus on antennæ, scutellum, coxæ and trochanters, yellowish: spot on pleura, most of metathorax and the abdomen, except base, pale rufous: wings hyaline, iridescent.

Male.—Head black; the face, clypeus, orbits, interrupted on each side near the summit, mandibles, except tips, and the palpi, pale yellowish; antennæ almost as long as the body, porrect, black, brown beneath, the 15th to 21st joints and the basal joint beneath, yellowish. Thorax black, tinged with brown above; collar above, tegulæ, a sutural line before and a short line beneath the fore-wing, a spot beneath the hind-wing, and an oblique line above the anterior coxæ, all yellowish; a transverse rufous mark on each side of the pleura; scutellum polished, yellowish, as well as a transverse spot behind it; metathorax finely punctured, profoundly impressed behind, pale rufous, its sides black and bilobed with black in front, on each side behind a small subobsolete yellowish spot. Wings hyaline, iridescent, the apical margins faintly tinged with fuliginous; nervures fuscous, pale at base, stigma blackish; areolet 5-angular. Legs: the four anterior coxæ, all the trochanters and the four anterior legs in front, yellowish-white; a spot on the four anterior femora behind, the posterior coxæ, their femora except extreme base, and the apical half of their tibiæ, black; remainder of the legs pale fulvous. Abdomen elongate, cylindric, slender at base, shining, dull rufous; basal segment linear, smooth and polished, black, its extreme apex rufous; basal half of the second segment depressed on each side. Length 3¼ lines; expanse of wings 6 lines.

Hab.—Illinois. Dr. Samuel Lewis.

11. **Isch. iridescens**, n. sp.

Yellow-rufous; antennæ black with a broad whitish annulation; face and tarsi whitish; apex of abdomen obfuscated; wings beautifully iridescent.

Male.—Yellowish-rufous, shining; face, frontal orbits, clypeus, spot on mandibles, space beneath the eyes and the palpi, whitish, the vertex and occiput piceous; antennæ more than half the length of the body, black, the 10th to 15th joints whitish, the basal joint beneath pale fulvous. Thorax polished, the tegulæ whitish, the suture just beneath the wings and pleura beneath immediately behind the fore legs, blackish; scutellum slightly convex, dull rufous as well as a spot behind it, the space on each side blackish; metathorax minutely punctured, shining, yellowish-rufous, the elevated lines tolerably well defined, the central area small, rather elongate. Wings hyaline, beautifully iridescent, nervures and stigma pale fuscous, the former pale at base; areolet 5-angular. Legs yellowish-rufous, the four anterior coxæ and all the tarsi, whitish; extreme tips of the tarsi blackish. Abdomen slender at base, polished, yellowish-rufous, the three apical segments brownish. Length 3 lines; expanse of wings 5 lines.

Hab.—Delaware. Dr. Thos. B. Wilson.

12. **Isch. albitarsis**, n. sp.

Very slender, black; most of the face, scutellum and tarsi, whitish; abdomen rufous; wings hyaline.

Male.—Very slender, black, shining; face: the inner orbits, broad beneath the antennæ, a bilobed spot just beneath the antennæ, most of the clypeus, a spot on each mandible, and the palpi, whitish; antennæ slender, about as long as the body, black, the basal joint beneath with a white spot. Thorax finely punctured; the tegulæ, a sutural line before and a short line beneath the fore-wing, the collar above and a spot on each side of the pleura just above the anterior coxa, whitish; scutellum slightly convex, polished, black, with a rather large whitish spot, and a short transverse whitish line behind it; metathorax black, finely and densely punctured, truncate behind, the elevated lines not well defined, the central area rather large, subquadrate, obsoletely defined. Wings hyaline, faintly tinged with fuliginous, slightly iridescent; nervures fuscous, pale at base, stigma black; areolet 5-angular or subtriangular. Legs black, the four anterior coxæ and trochanters beneath, their femora, tibiæ and tarsi before and the posterior tarsi, except base and extreme apex, whitish. Abdomen elongate, slender, cylindric, polished, rufous, the apex slightly blackish; basal segment linear, with a slight tubercle on each side behind the middle. Length 4½–5 lines; expanse of wings 6—7 lines.

Hab.—Illinois. Dr. Samuel Lewis.

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* * *

STATED MEETING, JULY 11.

President **Bland** in the Chair.

A communication was read from Mr. Bland reporting the capture by him in New Jersey, during June, of the following Coleoptera:— *Alaus myops*, *Boros unicolor*, *Helops gracilis*, *Brontes dubius* and *Elater rubricollis*, under the bark of pine trees; *Cucoplia pruinosa* on the Oak, and *Strangalia acuminata* and *Leptura nitens* on flowers. On July 4th he captured a considerable number of *Ancylochira lineata* and also its supposed variety *maculipennis*. Mr. Bland expressed his doubts about *maculipennis* being a variety of *lineata*, as each species seems to have their distinct markings and not varying so as to make one have the least resemblance to the other; they were both taken from the same kind of tree, and each species were found in coitu and in no instance were they amalgamating. On the same day he captured two fine specimens of *Chrysobothris concinnula* Lec., on the Oak being, to his knowledge, the first specimens collected in this locality, the typical specimen having been taken in Missouri. *Acanthoderes decipiens*, *Liopus variegatus*, *Eupogonius tomentosus*, *Pogonocherus mixtus*, *Adrastus testaceus* and *Megapenthes rufilabris* were part of the captures by beating bushes.

Also the following communication from Mr. H. F. Bassett, dated Waterbury, Conn., June 28th, 1864:—

I have this afternoon discovered a fact relating to the Cynips, or to *one species* rather (*C. q. operator* Osten Sacken), which you may, if you think proper, communicate to the Society at your next meeting. It seems to me to be quite important, throwing light upon some of the most difficult questions relating to the economy of this family.

Baron Osten Sacken (*Proc. Ent. Soc. Philad.* I. p. 248) asks, "Have the gall-flies of the Oak-apples *one* or *two* generations?" and at the close of his remarks on that subject declares "the question still undecided." The same subject is referred to in an earlier article on the Cynipidæ (*Proc. Ent. Soc. Philad.* I. p. 51), when speaking of his *C. q. palustris*, a species that appears in May. He asks: "May not this gall-fly have a second generation, and if it has, may not the gall of this second generation be different from the first produced, as it would be under different circumstances, in a more advanced season, perhaps, on leaves instead of buds?"

Dr. Fitch states (*N. Y. Rep.* II. §315, p. 33), that *C. q. seminator* Harris, produces two generations each year,—the *first* (second?) appearing in July, from the well-known wooly gall on the white oak, the last producing a somewhat similar autumnal gall from which the insect emerges the following spring.

I have not until this spring seen anything that favored this view.

Early this spring I reared a species of gall-fly, in considerable abundance, from galls gathered in the winter that are identical, I am quite sure, with the *C. q. batatus* Fitch, (I think Dr. Fitch has *described* an *inquilinæ* that I have reared from the same gall in great abundance, and not the insect producing the gall—I am not *sure* however,) and ten days ago a large number from *green* galls on the same trees, evidently the same though then green and succulent. I think the June crop *restock* the galls with eggs that are developed the following spring.

Certain species of galls are usually abundant this season, in this section. Those of *C. q. operator* O. S., can be gathered by the bushel. The flies have now nearly all appeared and I have watched them carefully to learn if possible whether the females deposited any eggs, and if so, whether they were deposited in the young leaf-buds.

I have reared thousands of the flies and have seen thousands more within a few days on the leaves of the shrub-oak, but have not been able to find any in the act of ovipositing until this afternoon.

On visiting a shrub-oak (*Q. ilicifolia*) thicket this afternoon I found *hundreds* of *C. q. operator* with the *ovipositor*, (nearly twice the length of the body,) *inserted the full length into the cups of the young acorns.*

The *acorn*, as yet, projects scarcely at all above the cup and the fly alighting on the edge of the cup inserts its ovipositor near the acorn but not touching it. I cut out the ovipositor of twelve or fifteen and found that their points did not touch, or at least penetrate the acorn, but seemed to curve around it so that they were almost directly under it. I did not in any case find more than one fly to a cup.

Those who have studied this family and have felt how difficult it is to account for the appearance of some of the vernal species, will appreciate the value of a discovery that will probably solve the mystery and that may possibly clear up the subjects of "agamous species" and "dimorphism."

I am inclined to think the larva now deposited will remain in the larva state until next spring, but shall not be surprised to learn they produce an autumnal brood that deposit their eggs in the matured leaf-buds. I shall await, impatiently, further developments. Many interesting questions arise as to what these developments may be. Will the gall-flies *agree specifically* with the parent,—when will they appear, and how many of our species will be found to produce two broods, and how many of our autumnal species are *dimorphous forms* of vernal species?

I am sure *all do not* produce two broods. *C. q. punctata* (nobis), for instance, which appeared in April, and whose galls appeared a few weeks later and produced no flies till the next April.

That you may see that I am not mistaken, I send you with this a few acorns with the fly still attached. They were killed by immersing in boiling water.

Also the following communication from Beverly R. Morris, M. D., dated Toronto, Canada West, July 8th, 1864:—

"POLYOMMATUS PORSENNA:—I took four specimens of this beautiful and rare insect on the 24th of May, 1864, at the Humber Plains, four miles west of Toronto and about a quarter of a mile from the lake shore, on the first road leading into the country beyond where the railway crosses the high-road. The day was not very warm, though fine; the insects were not very active: at first I thought I saw a specimen of *L. phlœas*, but I soon found out I had something new to me. They flew on in front of the horse, and I only saw them in the road. On June 15th, 1864, in company with Messrs. Saunders, Hubbut and Cowdry, I visited the same place, and we succeeded in taking in all about ten specimens. They were this day very active and difficult to capture, and were met with in open parts of the woods as well as on the road."

The following papers were presented for publication in the Proceedings:—

"On the Pupa of the Ephemerinous genus Bætisca, Walsh, by Benj. D. Walsh, M. A."

"Descriptions of new North American Coleoptera, by James H. B. Bland."

And were referred to Committees.

On ballot, Charles C. Cresson, M. D., was elected a *Resident* Member of the Society.

* * *

STATED MEETING, AUGUST 8.

President BLAND in the Chair.

The following papers were presented for publication in the Proceedings:—

"On certain Entomological Speculations of the New England School of Naturalists, by Benj. D. Walsh, M. A."

"Description of three new species of Cochliopodina, by Tryon Reakirt."

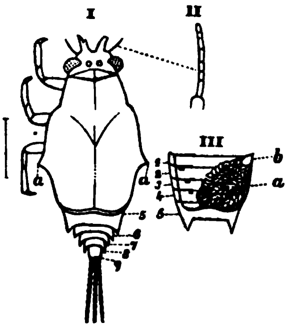
And were referred to Committees.

On report of the Committee, the following paper was ordered to be published.

On the Pupa of the Ephemerinous genus BÆTISCA Walsh.

BY BENJ. D. WALSH, M. A.

The pupa that forms the subject of the present Article, and of the female of which a figure is annexed, has been known to me for four years; but it was not till the present year that I succeeded in breeding the subimago from it. It differs from all described Ephemerinous pupæ in the antennæ being eight-jointed or thereabouts, not multiarticulate, and also in the branchiæ being internal and not used for locomotive purposes; and from all known larvæ and pupæ, and indeed from all known hexapod insects in any of their states, in the pro- meso- and meta-notum being connate and confluent and extending over one-half of the abdomen in the form of a large, dilated, convex carapace or shield, thus giving the insect a very Crustacean appearance. In the Orthopterous genus *Tetrix* and the Homopterous *Membracidæ*, as is well known, it is by a prolongation of the prothorax alone that the body of the insect is almost entirely concealed and covered above. In certain of the Heteropterous *Scutelleridæ* and in the foreign Chalcididous genera *Thoracantha* and *Galearia* (Hymenoptera), and the Indian Muscidous genus *Celyphus* (Diptera), it is by a prolongation of the mesoscutellum that the abdomen is almost entirely concealed above. But in all these cases the other thoracic segments are clearly distinguishable.



I had sent a ♀ specimen of the above pupa to Dr. Hagen in 1863, and subjoin his remarks on it, translating from the original French MS. :—

> The larva No. 66 is the most extraordinary animal that I have seen, so that I asked myself whether it really belonged to Insecta. But there is no doubt of the fact of its being the larva of a hexapod insect. The large compound eyes determine at once its position as belonging to those insects which have an incomplete metamorphosis, and therefore to Orthoptera.* or Hemiptera.

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* According to Erichson's and Sieboldt's views Dr. Hagen refers Pseudoneu-

As to Hemiptera, its mandibulate mouth excludes that Order. There remains therefore only the order Orthoptera, of which there are only three families with aquatic larvæ—Odonata, Perlina, and Ephemerina. The larvæ of Odonata always have the labium transformed into a well-known species of mask, which is not found here. It cannot therefore belong to Odonata. Perlina have only two caudal setæ, instead of three. There remains Ephemerina, and I believe that it belongs there, in spite of the antennæ being, as you observe, eight-jointed, and the absence of branchiæ. Possibly, however, there are branchiæ to the four basal segments of the abdomen, for I see something under the carapace, but do not choose to ruin a unique specimen by a more violent examination.

On inspecting the beautiful Ephemerina previously received from you, my eyes accidentally fell upon *Bætisca obesa*. Its robust form strikingly resembles that of this larva, when viewed at a distance. After a minute examination I believe that I am sure that this larva belongs to the genus *Bætisca*, and probably to *Bætisca obesa;* that is to say so far as one can be sure without actually breeding the imago. The head and the oviparous lamina are alike, and the carapace is represented in the imago, and even the groove on the dorsum of the abdomen that fits into the tip of the carapace.* But there is a sort of enigma here; for according to physiological and anatomical laws, we cannot understand how the pro- meso- and meta-thorax can be all soldered together in the larva. On the whole, it is about the most extraordinary larva known to science.

Those who are aware of the practical difficulty of correlating an insect, known only in the larva or pupa state, with its imago, will appreciate the successful acumen of the above analysis. One additional feature, by which the imago strikingly recals the larva and pupa, is not referred to by Dr. Hagen. In the characters of the genus *Bætisca*, I noticed that "the fifth abdominal joint is twice as long as any of the

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roptera to Orthoptera. See *Monogr. Calopt.* p. 1, note, and *Monogr. Gomphin*, p. 1, note; also LeConte's *Introd. Class. Coleopt.* p. viii, note. It is not quite true, as suggested in the last passage by Baron Osten Sacken, that Pseudoneuroptera, as contradistinguished from Orthoptera, are "essentially *aerial*, passing the greater portion of the time on the wing." In Odonata, indeed, this is the case, but Perlina and Psocina, and especially Psocina, to say nothing of Termitina, pass the greater portion of their time on trees, like the Orthopterous Catydids and tree-crickets.

* In the imago, as is usual in Ephemerina, the pro- and meso-thorax are separated by a free suture, and the meso- and meta-thorax by a connate suture, but the meso-scutellum extends over the abdomen to the tip of the *first*, or what some would call the *second* abdominal joint, thus simulating the carapace of the larva. The transverse, medial, sinuate carina on the 5th abdominal dorsal is remarkably distinct and strongly recals that found in the pupa, though it is not nearly so much elevated.

others, which are subequal." (*Proc. Acad. Nat. Sci. Philad.*, Sept. 1862, p. 378.) This is not known to be the case, so far as I am aware, in any other Ephemerinous imago. We can understand now why it should be so here. In the pupa this joint is abnormally developed to receive the tip of the carapace, and therefore, as is not unfrequently the case, traces of the same arrangement are found in the imago, though there are no longer the same special functions performed by the part. There is a feature, too, in the ornamentation of its legs which indicates that it belongs to Ephemerina, and not to Odonata as I had myself originally suspected. They are fasciate, not vittate; and I have already observed that Odonata never have fasciate legs, and might have added that, so far as known to me, Ephemerina never have vittate legs. (See *Proc. Acad. Nat. Sci. Philad.*, Sept. 1862, p. 383.)

It will have been noticed that Dr. Hagen calls the insect which I sent him, and which was identical in every respect with the one figured above, a *larva* and not a *pupa*. Authors generally tell us that in Insecta the pupa is distinguishable from the larva by having rudimentary wings, with the exception of course of those genera (*Diapheromera*. *Rhaphidophora*, &c.) which have no wings whatever in the imago state. Probably from the fact of there being no external wings in this insect, as in all other known Pseudoneuropterous pupæ, Dr. Hagen supposed it to be in the larva state. The above, however, is only another anomaly in this most anomalous creature. I have a specimen in alcohol from which the subimago has partly emerged, and which must necessarily therefore be in the pupa state; yet it has no external wings and the subimaginal wings lie flatly under the interior surface of the carapace; neither indeed had any of my other specimens any external wings. It is, I think, a mistake to suppose that in Insecta the possession of rudimentary wings is peculiar to the pupa as distinguished from the larva. Many insects that I have bred, e. g. a Psyllade inhabiting a gall on the hackberry (*Celtis occidentalis*), exhibit distinct rudimentary wings before their final moult into the pupa state; and I believe it is generally so with Pseudoneuroptera and Orthoptera, and probably in all those Orders which have an active pupa. Unless, indeed, which is contrary to all analogy, we choose to believe that an insect can moult after assuming the pupa and before assuming the imago state, and so consider it as a pupa as soon as the rudimentary wings begin to be developed, which in many Orthoptera saltatoria is at a very early period. The rule, however, seems to be, that in the larva state an insect moults about four times, and after assuming the pupa state not at all, until its final moult into the subimago or imago state. And this is shown clearly in those Orders (Coleoptera, the true Neuroptera, Hymenoptera, Lepidoptera and Diptera) which have a quiescent pupa, and where consequently the line of demarcation between the larva and pupa states is clearly drawn. Consequently, if this be a correct view of the case, just as in Perlina, Ephemerina, Odonata, &c., both the mature larva and the pupa have distinct external rudimental wings, so in the genus *Bætisca* neither the mature larva nor the pupa has them. And if the above considerations are correct, in none of these instances can the mature larva be distinguished from the pupa, except by ascertaining whether it has undergone its final moult before assuming the subimago or imago states. As regards *Bætisca obesa*, none of my specimens moulted while in my possession, and therefore those from which I bred the subimago must have been pupæ when I obtained them. The others, some of which were much smaller and might have been larvæ, after I had kept them in water alive for six or seven days, were either dissected or placed in alcohol, without awaiting their further development.

If any additional proof was required to establish the validity of my genus *Bætisca*, which is itself sufficiently remarkable in its characters, all drawn from the imago, the discovery of the very anomalous characters of its pupa would amply supply the deficiency.

GENUS BÆTISCA—PUPA.

Head freely moveable and connected with the thorax by membrane, with two horizontally porrect horns springing from above the anterior edge of the front, which are sometimes simply elongate-triangular, sometimes both of them deeply emarginate on the interior edge so as to present the appearance of a long exterior and a short interior horn, sometimes only one of them thus emarginate (as shown in Fig. I.) Anterior edge of front strongly carinate, deeply and widely emarginate in the middle opposite the labrum and less deeply so on each side. Epistoma scarcely extending forwards beyond the central emargination of the front, and separated from the labrum by a very distinct and deep transverse suture. Labrum moderate, transverse. Mandibles moderate, normal, appressed to the mouth and not extending forwards in the form of a horn. No palpi visible externally. Labium large, subquadrate, rather wider than long and not emarginate. Eyes ♂ large and almost contiguous; eyes ♀ much smaller and separated by a space equal to one-half the diameter of the head, with distinct rudiments of the two posterior ocelli between them. Antennæ (Fig. II.) inserted in a large but shallow cavity before the eyes, eight-jointed or thereabouts, the joints rather indistinct with appearances in some specimens of a 9th long and slender setiform joint. *Thorax* with the pro- meso- and meta-notum confluently soldered together in the form of a large convex shield, which has an inflected lateral flange for its entire length like the epipleura of the Coleopterous elytrum, and the tip of which fits accurately into a transversely sinuate medial groove on the fifth dorsal joint of the abdomen, immediately behind which groove runs a transverse carina. On the lateral edge of this shield about ⅔ of the way to its tip, and also on the side of its dorsum about ¾ of the way to its tip, there projects a large flattened triangular tooth, the lateral teeth (Fig. I. *a*) directed outwards, the dorsal teeth directed outwards and upwards and prolonged both forwards and backwards in an acute carina or elevated and angulated ridge. From the central point of the dorsum of this shield there extends obliquely forwards on each side a wide, shallow, ill-defined stria or depression which terminates before it reaches the lateral edge, the two striæ forming with each other from their origin an angle of about 90°. These striæ probably represent the suture between the pro- and meso-notum. Along the whole length of this shield, but obscurely interrupted before its middle and again just before its tip, extends a not very acute dorsal carina. Prosternum divided throughout by a suture, which is apparently connate, from the meso-sternum. Meso- and meta-sterna confluent with each other, as well as all the episterna and epimera. Central piece of sternum truncate in front, about as wide between the front legs as the anterior acetabulum, with the suture behind the front legs transverse, thence gradually widening to double its former width a little behind the middle legs, thence to its posterior edge, which is squarely truncate, with its sides nearly parallel. *Abdomen* 9-jointed dorsally, 8-jointed ventrally, joints 8 and 9 being ventrally confluent. The dorsal joints 1—4 and the anterior ½ of 5 soft and membranous, except a narrow lateral piece.

Joint 1 has attached to its lateral base a large, pale, fleshy branchia (Fig. III. *a*) full of dark-colored interlacing vessels, above the origin of which lies a much smaller flap-like piece (Fig. III. *b*) apparently devoid of vessels. Joints 2—4 have on each side a very distinct spiracle, to exhibit which in Fig. III, the left branchia is removed. Joint 5 is twice as long as any of the others, which are subequal, and rises upwards abruptly and almost vertically from its hind margin into a transversely sinuate carina to receive the tip of the thoracic shield, whence it is suddenly depressed downwards and forwards so as to leave a cavity under the tip of the shield for the two branchiæ to work in, the shield being attached by membrane to the inferior portion of the thorax, but only in front of the abdomen. *Caudal setæ* three, equal in length and diameter, multiarticulate and very finely pilose, the pilosity indistinct except when the insect is alive and in the water, when it is very obvious. *Legs* with the tarsi one-jointed and bearing a single robust claw, the tibiæ exceedingly short and connate with the tarsus. No external wings. The ♂ differs from the ♀, not only in its much larger eyes, but in being considerably slenderer.

In the only known species belonging to this genus (*B. obesa* Say, Walsh) the general color of the pupa is dull brown, variably marked above and below with luteous. The legs are luteous with the tarsus, tibia and femur each medially but irregularly fasciate with brown, and the femur with also a superior basal brown spot. Its general consistence is pretty firm.

The habits of this species are to frequent clear, rapidly-running rivers, and to attach themselves in repose to the under surface of submerged stones. Their food must consist almost exclusively of minute particles of matter floating in the water, for of two which I bred to the subimago state and two which partially attained that state—making four in all—three lived for over five and one for six or seven days in a glass vessel in clear but unfiltered cistern water, changed every twenty-four hours and containing no solid substance whatever but a piece of floating cork. I had originally placed a specimen in water containing several dead aquatic larvæ and some jelly-like masses, probably confervæ, which occurred in its natural station; but on noticing that it repeatedly crawled over such substances in an unconcerned manner, I placed them all in simple water. It is singular that, neither in the water nor out of the water, did I ever observe the antennæ to be disengaged from the lower surface of the breast and thrust forwards. They crawl quite slowly, but swim very rapidly, the caudal setæ being the chief organ of motion in swimming, and the legs being only used occasionally to direct their course. When swimming the caudal setæ and the tip of the abdomen are directed upwards and backwards at an angle of 45° with the body, and with this as the axis of oscillation are vibrated vigorously and rapidly up and down. When desirous of rapidly changing their course, they have the power of elevating the tip of the abdomen and setæ so as to lie along the dorsum of the shield, and then suddenly lashing out with them. I noticed that in repose they sometimes adhered to the under surface of the floating cork for hours together, and sometimes to its side, so that their body would be half in and half out of the water. When they were taken out of the water the tip of the notal shield generally after a few seconds gaped apart from the fifth dorsal joint of the abdomen, and the palpitations and structure of the branchiæ became plainly visible under the shield. The reason is obvious. They were then compelled to breathe through their spiracles, instead of through their branchiæ.

The pupa crawls out of the water to assume the subimago state, which process is performed by the notal shield splitting open dorsally in a straight line from end to end, and the head being disengaged backwards from the pupal head without splitting it. Described from 8 specimens, some living, some alcoholic, procured in the Mississippi Rapids, June 5—11; the first subimago appeared June 13, from a specimen obtained June 5. Length ♂ (one specimen) 7 millimetres, ♀ (one specimen) 7½ mill. Breadth ♂ 3½ mill. ♀ 4 mill. Setæ ♂ 2½ mill. ♀ 2½ mill.

ROCK ISLAND, ILLINOIS, July 1, 1864.

STATED MEETING, September 12.

President Bland in the Chair.

On report of the respective Committees, the following Papers were ordered to be published.

ON CERTAIN ENTOMOLOGICAL SPECULATIONS OF THE NEW ENGLAND SCHOOL OF NATURALISTS.

BY BENJ. D. WALSH, M. A.

I. In Prof. Agassiz's Book on Lake Superior, he asserts in the most unqualified manner that the Insects of the temperate zone of North America "differ specifically throughout" from those of Europe. And subsequently he remarks that "quite a number of European insects have been introduced into this country along with plants, among which may be mentioned some showy butterflies, as *Vanessa Atalanta*, *cardui* and *Antiopa*, which are very erroneously considered by some entomologists as native Americans." (Pp. 187, 190.)

This assertion is the more startling, because he himself catalogues in the same work a very great number of plants as common to the temperate zones of North America and Europe, some of which he considers as introduced, while at the same time he distinctly states that he does not intend to deny the fact of others being indigenous both in North America and in Europe, (*ibid* p. 187); and because the very same work that contains the above remarks contains also a list of Coleoptera by Dr. LeConte, in which several species are enumerated as in his opinion common to both Continents,* and at the conclusion of which it is expressly asserted by that author, that there are certain rare cases in which "the same species, or organic forms so similar as to present no appreciable difference, appear at points so situated as to preclude the possibility of any intercommunication." (*Ibid.* pp. 201—239 and p. 239.)

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* E. g. *Bembidium 4-maculatum* Lin., *Upis ceramboides* Fabr., *Hippodamia 13-punctata* Lin., and *Coccinella 15-punctata* Oliv.

Since, 1*stly*, it is not denied even by Prof. Agassiz himself, that many plants which cannot be supposed to have been introduced are common to the two continents; since, 2*ndly*, several birds, which cannot be reasonably supposed to have been introduced, for example the common mallard, the blue-winged teal and the magpie, are common to both continents; and since, *lastly*, there is a mammal—*Homo sapiens* Lin.—common to both continents, though the American variety differs so remarkably from the European one, that if an American insect differed as much from a European one it would undoubtedly be considered as a distinct species;—for these three reasons, arguing *a priori*, it might be reasonably inferred that out of the vast multitude of insects there would be at least a few species indigenous on both sides of the Atlantic. Yet, owing to the preponderant influence exerted for many years back over American naturalists by Prof. Agassiz, most entomologists in this country have hitherto either tacitly acquiesced in his theories or become devoted believers in them. Hence the American describers of new species of insects have generally been content with ascertaining, that a species supposed to be new had not been hitherto described as American, and have troubled their heads but little as to whether the same species might not have been described as exotic. Had it been otherwise, many more species would probably have been found to be common to the New and Old Worlds than it is possible now to point out. Latterly, however, in two Orders*—Neuroptera and Diptera—the

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* I use the term *Orders* here and throughout in the ordinary sense of the term. Agassiz considers Insects, Crustaceans and Worms as the three *Classes* of Annulata, and Insects he subdivides into three *Orders*—Winged Insects, Arachnida (Spiders, &c.) and Myriapoda (Centipedes, &c.). What are usually called Orders by Entomologists, are apparently degraded by him into *Suborders*. Dr. LeConte calls the *Orders* of Agassiz *Subclasses*, and uses the term *Orders* in its ordinary sense. Prof. Dana uses the terms *Class* and *Order* in the same sense as Agassiz, and calls Hymenoptera, Diptera, &c. *tribes*, introducing between the *Order* and the *Tribe* certain divisions which he denominates *suborders* and *ordinules*. "Nominum hæc continua subversio," says Latreille, speaking of the continual substitution of one generic name for another, "scientiam occidit." (Gen. Cr. et Ins. iv. p. 19.)

American fauna has been subjected to a searching comparison with that of Europe and other countries by two distinguished European naturalists, Dr. Hagen and Mr. Loew. In the former order it results from Dr. Hagen's investigations, that out of 716 North American species no less than 16, or 2.23 per cent, are undoubtedly common to Europe and North America, to say nothing of several species of doubtful identity, and of 14 North American species which occur also in Asia, Africa or Polynesia.* In the latter Order, Diptera, it results from Mr. Loew's investigations that, out of 2058† North American species or thereabouts, the extraordinary number of 91 species, or 4.42 per cent, are ascertained with certainty to be common to Europe and North America, and there are many others which, although they differ slightly in the two countries, are believed by Loew to be of the same descent.‡

But, some will say, all these species may have been introduced into one or the other country, and not be indigenous in both. Mr. Loew investigates this question in the case of Diptera at considerable length, comparing the intermingling of different faunas on the shores of the Mediterranean, where commercial intercourse has been carried on for time immemorial, and not merely for a few centuries, and where the voyages are comparatively brief; and finally decides that it is "utterly improbable that all the species, now occurring on both continents, should have been gradually carried over from one to the other." In the case of the Pseudoneuropterous Dragon-flies, no less than nine species of which occur both in the New and in the Old World, it is altogether out of the question, in view of the well known difficulty of breeding these insects in confinement, that they could have been introduced from one country to the other by human agency.

A strenuous disciple of Prof. Agassiz observes to me, that "the most that can be said of those species which are asserted to be common to both continents is, that no distinctions have yet been discovered on careful study." At this rate, if I choose to assert that the Insects of Illinois differ specifically throughout from those of the other States, I may successfully defend that absurd hypothesis against the whole world by the same curious method of argumentation. Surely the large percentage of forms asserted on the very best authority to be identical, cuts the ground away from under such reasoning as this. Suppose, which is scarcely a supposable case, that it is only an even chance that Loew is right, in deciding that the Dipterous North American form A_1 is identical with the European form E_1; then the chance of his being mistaken in this particular instance will be $\frac{1}{2}$, and the *compound* chance of his being mistaken in *every one* of *n* similar cases, as to species A_2 and E_2, A_3 and E_3, ... A_n and E_n, will be $\frac{1}{2^n}$, which when *n* is large becomes so exceedingly small that it is scarcely worth taking into account. But in this case *n* is exceedingly large and consequently $\frac{1}{2^n}$ almost inconceivably small, so that the chance of Loew being mistaken *throughout* amounts almost, according to the Theory of Chances, to a negative certainty.* Or are facts and figures to go for nothing, and are we to form our theories first, and afterwards ignore or deny all facts and all reasonings that run counter to those theories?

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* Hagen's *Synopsis N. A. Neur.* p. 332.

† Osten Sacken's Catalogue of described N. A. Diptera, contains 2058 species. Very many of these are professedly mere synonyms; but on the other hand many new species have been described since that Catalogue appeared (A. D. 1858,) and several undescribed species are taken into the account by Loew.

‡ *Diptera of the Amber-fauna,* by Director Loew; translated in *Silliman's Journal,* May, 1864, by Baron Osten Sacken.

In order to throw further light upon this question, I have prepared, from the very limited resources at my disposal, the following imperfect list of species in all the Orders, which are asserted by authors to be found both in North America and in the Old World. I have followed Loew's example in including in the list all species common to both countries, even those which I believe myself to have been introduced, because to attempt to draw any line between introduced and indigenous species would be begging the question at issue. The authority in the case of each species is printed in *italics*. The general results may be thus tabulated :—

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* Assuming the chance of Loew's being mistaken in a single average case to be as large as it may seem proper, say $\frac{p-1}{p}$ taking *p* pretty large, yet when *n* is so exceedingly large as it is here, the chance of his being mistaken *throughout*, or $(\frac{p-1}{p})^n$, will always be a very small quantity indeed.

	Identical Species.	*Species closely allied or of doubtful identity.*	*Total.*
Coleoptera	50	11	61
Orthoptera	1	0	1
Pseudoneuroptera	10	10	20
Neuroptera	9	2	11
Hymenoptera	5	4	9
Lepidoptera	57	6	63
Homoptera	2	1	3
Heteroptera	5	2	7
Diptera	165	20	185
	Total...304	56	360

Species of Insects common to North America and the Old World.

COLEOPTERA.—Identical species.

Carabidæ. Amara vulgaris (Eur. and Boreal America) *Kirby.*—A. communis (Eur. and U. S.) *Dejean.*—A. familiaris (Eur. and U. S.) *Dejean.*—A. similata (Eur. and U. S.) *Dejean.*—Curtonotus convexiusculus (Eur. and Bor. Am.) *Kirby.*—Pterostichus orinomum (Eur. and N. A.) *Kirby* and *Klug.*—Bembidium oppositum Say and B. 4-maculatum (Eur.) *LeConte.*—B. tetracolum Say and B. rupestre (Eur.) *LeConte.*—**Gyrinidæ.** Gyrinus æneus (Eur. and Bor. Am.) *Kirby.*—**Hydrophilidæ.** Philhydrus marginellus (Eur. and Bor. Amer.) *Kirby.*—Ph. melanocephalus (Eur. and Bor. Am.) *Kirby.*—Hydrobius fuscipes (Eur. and Bor. Am.) *Kirby.*—Cercyon mundum Melsh. and C. centrimaculatum (Eur.) *LeConte* and *Erichson.*—C. maculatum Melsh. and C. anale (Eur.) *LeConte* and *Erichson.*—**Silphidæ.** Silpha caudata Say and S. lapponica (Eur.) *LeConte.*—**Staphylinidæ.** Tachinus trimaculatus Say and Bolitobius pygmæus (Eur.) *Erichson.*—Tachyporus faber Say and T. brunneus (Eur.) *Erichs.*—Oxytelus rugulosus Say and O. nitidulus (Eur.) *Erichs.*—Olisthærus laticeps Lec. and O. megacephalus (Eur.) *LeConte.*—**Phalacridæ.** Olibrus bicolor (Eur. and U. S.) *LeConte.*—**Cucujidæ.** Silvanus dentatus Say and Nausibius dentatus (Eur.) *Le Conte.*—**Mycetophagidæ.** Typhœa fumata (Eur. and all parts of the world) *Le Conte.*—**Dermestidæ.** Dermestes lardarius (Eur. and N. A.) *Melsheimer, &c.**—Attagenus cylindricornis Say and A. megatoma (Eur.) *LeConte.*—**Byrrhidæ.** Byrrhus alternatus Say and Cytilus varius (Eur.) *LeConte.* **Scarabæidæ.** Onthophagus rhinocerus Melsh. and O. xiphias (Eur.) *Melsheimer.*—Aphodius nodifrons Rand. and A. fimetarius (Eur.) *LeConte.*—A. 4-tuberculatus Fabr. and A. granarius (Eur.) *LeConte.*—A. pensvallensis Melsh. and A. erraticus (Eur.) *Melsh.*—Cetonia vestita Say and C. hirta (Eur.) *Schaum and others.*—**Buprestidæ.** Melanophila longipes Say and M. appendiculata (Eur.) *Kirby and others.*—**Ptinidæ.** Rhizopertha pusilla (Eur. and N. A.) *LeConte.*—**Tenebrionidæ.** Tenebrio reticulatus Say (Can. Me. and Lake Sup.) and Upis ceramboides (Eur.) *LeConte.*—T. molitor (Eur. and N. A.) *Melsh.* &c.—**Melandryidæ.** Xylita buprestoides Payk. (Eur. and Bor. Am.) *Kirby.*—**Œdemeridæ.** Œdemera apicalis Say and Nacerdes melanura (Eur.) *LeConte.*—**Curculionidæ.** Sitophilus granarius (Eur. and N. A.) *Harris.* Sitophilus remotepunctatus (Europe and North Amer.) *Harris.*—**Cerambycidæ.** Callidium antennatum Newm. and C. violaceum (Eur.) *Harris.*—**Crioceridæ.** Crioceris asparagi (Eur. and N. A.) *Fitch.*—**Galerucidæ.** Galeruca sagittariæ Gyllenh. (Eur. and N. A.) *Kirby.*—G calmariensis (Eur. and N. A.) *Melsh.* &c.—**Chrysomelidæ** Eumolpus cochlearius Say and Adoxus (bromius) vitis (Eur.) *Kirby.*—Chrysomela cæruleipennis Say and C. polygoni (Eur.) *LeConte.*—C. lapponica Lin. (Eur. and Bor. Am.) *Mannerheim.*—Phyllodecta vitellinæ (Eur. and N. A.) *Kirby.*—Ph. rufipes (Eur. and N. A.) *Kirby.*—**Coccinellidæ.** Coccinella mali Say and Myzia 15-punctata (Eur.) *LeConte.*—C. tibialis Say and Hippodamia 13-punctata (Eur.) *LeConte.*—C. bioculata Say and C. bipunctata (Eur.) *Mulsant.*—In all 50 species.

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* As I have already said, (*Proc. Ent. Soc. Phil.* II. p. 184.) I find this species abundant in the woods of Illinois remote from houses, and incline to believe that it is indigenous.

COLEOPTERA.—Species closely allied or of doubtful identity.

Carabidæ. Elaphrus ruscarius Say and E. riparius (Eur.) very near. *Say.*—Notiophilus semistriatus Say and N. aquaticus (Eur.) possibly the same. *Dejean.*—Diachila subpolaris Lec. (Bor. Am.) and D. arctica (Eur.) allied. *LeConte.*—**Dytiscidæ.** Hydroporus dubius Melsh. and H. dorsalis (Eur.) *Melsh.*—**Staphylinidæ.** Staphylinus dimidiatus Say and Philonthus ventralis (Eur.) probably the same. *Leconte.*—Acidota seriata Lec. and A. crenata (Eur.) descriptions agree. *LeConte.*—**Nitidulidæ.** Nitidula undulata Say and N. varia (Eur.) analogous. *Say.*—**Dermestidæ.** Dermestes nubilus Say and D. murinus (Eur.) very near. *Say* and *LeConte.*—**Tenebrionidæ.** Boros unicolor Say and B. elongatus (Eur.) very near. *Say* and *LeConte.*—**Curculionidæ.** Dryophthorus corticalis Say and D. lymexylon (Eur.) very near. *Say.*—**Coccinellidæ.** Chilocorus bivulnerus Muls. (=stigma *Say*) and C. renipustulatus (Eur.) very near. *Kalm* and *Say.*—In all 11 species.

ORTHOPTERA.—Identical species.

Blatta orientalis* (Asia, Eur., Atlantic seaboard of U. S.) *Harris, Scudder.*

PSEUDONEUROPTERA.—Identical species.

Termitina. Termes flavipes Köll. (Hot-houses Germ. and N. A.) *Hagen.*—

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*I found a single ♀ of what is probably this species under bark nearly a mile from any houses near the little inland village of Jonesboro in South Illinois. So far as I am aware, it does not occur anywhere in Illinois in houses. Perhaps commerce may have introduced it at St. Louis, and it may have spread thence into South Illinois. In North Illinois it does not occur at all, so far as I know, though we have two species of Blattidæ there belonging to Mr. Scudder's new genus Platamodes, and another which apparently must form a new genus.

Agrionina. Calopteryx splendens Selys. (Eur., N. Asia and Georgia ?) *Hagen.*—**Æschnina.** Anax Junius Drury (N. A. everywhere and Asia) *Hagen*—Æschna juncea Lin. (Russ. Am., Eur. and Asia) *Hagen.*—Æ. grandis Lin. (New Jersey, Eur., Asia) *Hagen.*—**Libellulina.** Pantala flavescens Fabr. (N. and S. Am., Asia, Oceanica, Africa. Eur.?) *Hagen.*—Tramea chinensis DeG. (Carolina, Virginia and Asia) *Hagen.*—Libellula 4-maculata Lin. (Can., Wisc., Mass., Illin., Eur., Asia) *Hagen.*—Mesothemis corrupta Hag. (Tex., Illin. and Asia) *Hagen.*—Diplax scotica Don. (North Red Riv. N. A., Eur., Asia) *Hagen.*—In all 10 species.

PSEUDONEUROPTERA.—Species closely allied or of doubtful identity.

Psocina. Psocus salicis Fitch = geologus Walsh (N. Y., Ill.) and Ps. pedicularius (Eur.) *Hagen.*—**Ephemerina.** Cloe bioculata (N. Y., Hudson's Bay Terr. and Eur.) *Walker & Hagen*—Cl. diminuta Walk. (Florida) and Cl. lactea (Eur.) allied. *Hagen.*—**Agrionina.** Lestes forcipata Hag. Synops. = hamata Monogr. Agr. (Wisc., D. C. and Illin.) and L. nympha (Eur.) hardly different. *Hagen.*—Agrion annexum Hag. and A. cyathigerum (Eur.) allied. *Hagen.*—**Æschnina.** Ophiogomphus colubrinus Selys (H. B. T.) and O. serpentinus (Eur.) very much alike. *Hagen.*—Cordulegaster Sayi Selys (Georgia) and C. annulatus (Eur.) similar. *Hagen.*—Æschna sitchensis Hag. (Russ. Am.) and Æ. borealis (N. Eur. and Siberia) very much alike. *Hagen.*—**Libellulina.** Libellula julia Uhler (Wisc., Wash. T.) and L. fulva (Eur.) analogous species. *Hagen.*—Diplax (rubicundula Say =) assimilata Uhl. (U. S.) and D. flaveola (Eur.) very much alike. *Hagen.*—In all 10 species.

NEUROPTERA.—Identical species.

Sialina. Rhaphidia media Burm. (Eur. and N. A.) *Hagen.*—**Hemerobina.** Chrysopa flava Scop. (Penna., Eur., Asia.) *Hagen.*—**Phryganeina.** Limnophilus rhombicus Lin. (H. B. T., Greenland, Eur., Asia.) *Hagen.*—L. interrogationis Zett. (Greenland, Lapland, Eur.) *Hagen.*—L. subpunctulatus Zett. (Bor. Am. and Eur.) *Hagen.*—L. trimaculatus Zett. (Bor. Am. and Eur.) *Hagen.*—L. griseus Lin. (Greenland, Eur., Asia.) *Hagen.*—Leptocerus niger Lin. (D. C. and Eur.) *Hagen.*—Setodes ochracea Curt. (Georgia and Eur.) *Hagen.*—In all 9 species.

NEUROPTERA.—Species closely allied or of doubtful identity.

Phryganeina. Phryganea commixta Walk. (Georgia) and P. minor (Eur.) allied. *Hagen.*—Colpotaulius perpusillus Walk. (H. B. T.) and C. incisus (Eur.) very closely allied. *Hagen.*—In all 2 species.

HYMENOPTERA.—Identical species.

Tenthredinidæ. Cimbex 10-maculata Leach (Canada and Eur.) *D'Urban.*—**Uroceridæ.** Sirex bizonatus Steph. (Can. and Eur.) *Kirby.*—S. juvencus Lin. (Bor. Am. and Eur.) *Kirby.*—**Vespidæ.** Vespa vulgaris Lin. (N. A. and Eur.) *Saussure* and *Norton* MS.—**Apidæ.** Apis mellifica Linn. (N. A. and Eur.) *St. Fargeau*, &c.—In all 5 species.

HYMENOPTERA.—Species closely allied or of doubtful identity.

Tenthredinidæ. Zarea inflata Nort. and Z. fasciata (Eur.) *Norton.*—Nematus monochroma Nort. and N. luteus (Eur.) *Norton.*—N. proximatus Norton and N. proximus (Eur.) *Norton.*—N. luteotergum Nort. and N. dimidiatus (Eur.) *Norton.*—In all 4 species.

LEPIDOPTERA.—Identical species.

Papilionidæ. Papilio zolicaon Luc. (Calif.) and P. Machaon (H. B. Terr. and Eur.) *Menétries.*—**Pieridæ.** Colias Edusa (Four quarters of the globe.) *Boisd.*[*]—C. Chrysotheme (N. A. and Eur.) *Boisd.*[†]—C. Hyale (Califor., Eur., Africa) *Boisd.*[†]—Pieris Callidice Godt. (Rocky Ms. and Eur.) *Doubleday.*—P. Leucodice Eversm. (Siber. and Cal.) *Boisduval.*—Anthocaris ausonia Hübn. (Calif. and Eur.) *Hübn.*—Rhodocera rhamni Lin. (Calif., Eur.) *Boisduval.*—**Nymphalidæ.** Argynnis Aglaia Lin. (Calif., Rocky Ms., Eur.) *Godart* and *Edwards.*—Grapta Faunus Edwards (N. Y. and Penna.) and G. C-album (Eur.) *Boisd. & Lec.*—Vanessa Antiopa Lin. (U. S. and Eur.) *Harris,* &c.—Pyrameis Atalanta Lin. (U. S. and Eur.) *Harris,* &c.—P. cardui Lin. (4 quarters of the globe) *Morris,* &c.—**Satyridæ.** Chionobas balder Boisd. and Lec. (North Cape, Greenland, Labr.) *Boisd.*—Ch. bootes Bdv. and Lec. (North Cape, Greenland, Labr.) *Boisd.*—Ch. œno Bdv. (Lapland, Siberia, Labr.) *Boisd.*—**Lycænidæ.** Lycæna americana Harr. and L. phlœas (Eur.) *Boisd.*—**Hesperidæ.** Hesperia silvanus Bdv. (Calif. and Eur.) *Boisd.*—H. comma Lin. (Calif. and Eur.) *Boisd.*—**Sphingidæ.** Trochilium tipuliforme Lin. (Eur. and U. S.) *Harris* and *Fitch.*—Deilephila chamænerii Harr. (U. S.) and D. galii (Eur.) *Walker.*—**Arctiadæ.** Orgyia antiqua (Eur. and U. S.) *Harris.*—**Noctuadæ.** Leucania straminea Treitsch. (N. Y. and Eur.) *Guén.* and *Cat. Brit. Museum.*—L. pallens Lin. (U. S. and Eur.) *Morris* MS.—L. unipuncta Haw. (army-worm moth) = extranea Guén. (Eur. and U. S.) *Guén.* and *Stainton's Entom. Annual.*—Scoliopteryx libatrix Lin. (Eur. and U. S.) *Guén.* and *Cat. B. M.*)—Nænia typica Doubled. (Eur. and U. S.) *Cat. B. M.*—Plusia festucæ Albin. (Eur. and N. A.) *Guén. C. B. M.*—Pl. Mya Hübn. (Eur., Can.) *Guén. C. B. M.*—Euplexia lucipara Lin. (N. Y., Eur.) *Guén. C. B. M.*—Eurois herbida Den. and Schieff. (N. A., Eur.) *Guén. C. B. M.*—E. occulta Guén. (Can. and Eur.) *Guén. C. B. M.*—Hadena W-latinum Guén. (N. A., Eur.) *Guén. C. B. M.*—H. pisi Lin. (N. A., Eur.) *Guén. C. B. M.*—H. rectilinea Esper. (N. A., Eur.) *Guén. C. B. M.*—H. amputatrix Fitch and H. amica (Eur. and U. S.) *Fitch* and *Stephens.*—Graphiphora C-nigrum auct. (U. S. and Eur.) *Guén. C. B. M.*—G. triangulum Guén. (N. Y. and Eur.) *Guén. C. B. M.*—G. Dahlii (U. S. and Eur.) *Guén. C. B. M.*—G. augur Fabr. (U. S. and Eur.) *Guén. C. B. M.*—G. baja Gmel. (N. Y. and Eur.) *Guén. C. B. M.*—Orthosia instabilis Schifferrmyller (New York and Europe) *Fitch.*—Cucullia chamomillæ Fab. (N. Y. and Eur.) *Guén. C. B. M.*—Agrotis suffusa Den. and Sch. (U. States,

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[*] Messrs. Edwards and Scudder consider that the species which has been taken for Edusa in the United States is C. Eurytheme Boisd. = C. Amphidusa Boisd. (Calif. and Western States.)

[†] Mr. Scudder considers that the species mistaken for Hyale in California is the pale ♀ of Eurytheme, and also, if I understand him aright, that the species mistaken for Chrysotheme is the common Philodice.

Eur., Asia) *Guén. C. B. M.*—A. ravida Den. and Sch. (U. S. and Eur.) *Guén.*—A. subgothica (U. S. and Eur.) *Fitch.*—Chersotis plecta Lin. (N. Y. and Eur.) *Grote.*—Dipterygia pinastri Lin. (U. S. and Eur.) *Grote.*—Heliothis umbrosa Grote and H. armigera Lin. (U. S. and Eur.) *Grote.*—**Pyralidæ.** Aglossa cuprealis Hübn. (U. S. and Eur.) *Guén. C. B. M.*—**Microlepidoptera.** Carpocapsa pometella (U. S. and Eur.) *Fitch, &c.*—Tinea lanariella Clemens and T. biselliella (Eur.) *Stainton.*—T. nubilipennella Clem. and T. fuscipunctella (Eur.) *Stainton.*—Plutella vigilaciella Clem. and P. porrectella (Eur.) *Stainton.*—Pl. limibipennella Clem. and Pl. cruciferarum (cosmopolitan) *Stainton.*—Nepticula rubifoliella Clem. and N. angulifasciella (Eur.) *Clemens.*—Gelechia cerealella Oliv. (U. S. and Eur.) *Harris* and *Clemens.*—In all 57 species.

LEPIDOPTERA.—Species closely allied or of doubtful identity.

Noctuadæ. Catocala Walshii Edwards (South Illin.) and C. elocata (Eur.) *Edwards.*—Plusia alticola Walker (=ignea Grote) and P. divergens (Eur.) *Grote.*—**Microlepidoptera.** Loxotænia rosaceana Harr. and L. rosana (Eur.) doubtful if different. *Fitch.*—Tinea biflavimaculella Clem. and T. spilotella (Eur.) *Stainton.*—Argyresthia oreasella Clem. and A. andereggiella (Eur.) *Stainton.*—Bedellia staintoniella Clem. and B. somnulentella (Eur.) *Stainton.*—In all 6 species.

HOMOPTERA.—Identical species.

Aphidæ. Aphis mali (N. A. and Eur.) *Fitch.*—**Coccidæ.** Aspidiotus conchiformis (N. A. and Eur.) *Fitch.*—In all 2 species.

HOMOPTERA.—Species closely allied or or doubtful identity.

Cercopidæ. Ledra aurita (Illin. and Eur.) *Walsh* MS.

HETEROPTERA.—Identical species.

Cereidæ. Xylocoris domesticus Hahn (N. A. and Eur.) *Fitch.*—**Lygæidæ.** Lygæus geminatus Say and Cymus resedæ (Eur.) *Uhler.*—**Cimicidæ.** Cimex lectularius (N. A. and Eur.) *Fitch.*—**Hydrometridæ.** Gerris paludum (Eur. and N. A.) *Uhler* MS.—Gerris lacustris (Eur. and N. A.) *Uhler* MS.—Dr. Fitch states generally of this Order that very many American species are certainly identical with those of Europe. (N. Y. Rep. I. p. 295.)—In all 5 species.

HETEROPTERA.—Species closely allied or of doubtful identity.

Lygæidæ. Lygæus eurinus Say and Alydus calcaratus (Eur.) *Uhler.*—**Nepidæ.** Ranatra fusca Beauv. (Illin.) and R. linearis (Eur.) *Walsh* MS.—In all 2 species.

DIPTERA.—Species common to N. A. and Europe, named with certainty and from personal investigation by Loew.*

Anopheles maculipennis Meig.—A. quadrimaculatus Say = pictus Loew.—A. nigripes Stæg.—Tanypus choreus Meig.—Ceratopogon lineatus Meig.—

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* The first three lists of Diptera are copied verbatim from those appended by Loew himself to the translation of his Paper on the "Diptera of the Amber-fauna" by Baron Osten Sacken, (*Sill. Journ.* May, 1864, pp. 317—319.) Consequently, except for three species enclosed in brackets at the end of the first list, Loew is here the authority throughout.

Cecidomyia destructor Say = funesta Motch. = secalina Lw.—Scatopse atrata Say = recurva Lw.—Scatopse notata Linn.—Aspistes borealis Lw.—Rhyphus fenestralis Scop.—R. punctatus Meig. = marginatus Say.—Cœnomyia ferruginea Fabr.=pallida Say.—Sargus viridis Say=frontalis Lw., provided the specimen, communicated to me as European, really belonged to the Old World.—Eristalis æneus Scop.=sincerus Harris.—Imatisma posticata Fabr.= cimbiciformis Fall.—Syritta pipiens Linn.—Xylota pigra Fabr. = hæmatodes Fabr.—Platychirus granditarsus Först.—Brachyopa ferruginea Fall.—Scenopinus fenestralis Linn. = pallipes Say.—Sc. lævifrons Meig.—Dolichopus brevipennis Meig.—Dol. plumipes Scop.—Dol. discifer Stann.—Scellus spinimanus Zett.—Psilopus pallens Wied.=albonotatus Lw.—Œstrus bovis Fabr.—Cephalomyia ovis Linn.—Gastrus equi Linn.—Melanophora roralis Linn.—Pollenia rudis Fabr.—Musca domestica Linn.—Cyrtoneura meditabunda Fabr.—C. stabulans Fall.—Mesembrina resplendens.—Stomoxys calcitrans Linn.—Anthomyia diaphana Wied.—A. stygia Meig.—Aricia morioides Zett.—Hylemyia angelicæ Scop.—Hydrotæa dentipes—Hylemyia urbana Meig.—Homalomyia canicularis Linn.—H. subpellucens Zett.—H. manicata—H. scalaris Fabr.—Hydrotæa armipes Fall.—Ophyra leucostoma Wied.—Lispe uliginosa Fall.—Scatophaga squalida = S. furcata Say?—S. stercorea Linn.—Cordylura hircus.—Sapromyza lupulina Fabr.—Scyphella flava Linn.—Lauxania cylindricornis Fabr.—L. frontalis Lw.—Psila bicolor—Sciomyza nana Fall.—S. obtusa Fall.—S. albocostata Fall.—Dryomyza anilis Fall.—Blepharoptera iners—Ortalis vibrans Linn.—O. cana Lw.—Piophila casei Linn.—P. nigriceps Meig.—P. petasionis R. Desv.—Heteroneura albimana—Borborus equinus Fall.—Drosophila ampelophila Lw.—D. transversa.—D. graminum.—Stegana nigra Meig.—S. hypoleuca Meig.—Dichæta caudata Fall.—D. brevicauda Lw.—Scatella quadrata Fall.—Sc. Stenhammari Zett.—Ochthera mantis DeG.—Ilythea spilota Hal.—Melophagus ovinus Linn.—Olfersia ardeæ Macq.—Hippobosca equina Linn.

Besides a great many other species, the occurrence of which on both continents is recorded with less certainty, the following European species are found in Greenland, according to Stæger's trustworthy statements:—Diamesa Waltlii Meig.—Chironomus byssinus Meig.—C. aterrimus Meig.—C. picipes Meig.—Trichocera maculipennis Meig.—Sciara flavipes Meig.—Calliphora erythrocephala Meig.—Phytomyza obscurella Fall.

[Rhipidia maculata Meig. and Symplecta punctipennis Meig. may be also added with certainty.—*O. Sacken.* Also, according to Osten Sacken apud *Say's Works* I. p. 243, Limnobia annulata Linn. = argus Say = imperialis Lw.—*B. D. W.*]—In all 94 species.

DIPTERA.—Species believed to be of the same descent but distinguishable from European species by a slight, but constant, difference of coloring.

Subula pallipes Lw. (N. A.) and S. marginata Meig. (Eur.)—Chrysotoxum sp. indescr. and C. bicinctum Linn.—Tetanocera pictipes Lw. and T. umbrarum Linn.—T. saratogensis Fitch and T. pratorum Fall.—Hemerodromia valida Lw. and H. Frigelii Zett. and a large number of others.—In all 5 species.

DIPTERA.—Species believed to be of the same descent but distinguishable, in addition to the above, by very insignificant plastic discrepancies.

Bombylius fraterculus Wied. and B. major Linn. (Eur.)—Chrysotoxum sp. indescr. and C. fasciolatum DeG.—Helophilus sp. indescr. and H. frutetorum Fabr.—Lucilia sp. indescr. and L. cæsarion Meig.—Cyrtoneura sp. indescr. and C. assimilis Fall—Gymnosoma par Walk. and G. rotundata Linn.—Cordylura sp. indescr. and C. pudica Meig.—Allophyla lævis Lw. and A. nigricornis Meig.—Trypeta fratria Lw. and T. heraclei Linn.—Ortalis rufipes Lw. and O. marmorea Fabr.—Drosophila sp. indescr. and D. funebris—Ephydra atrovirens Lw. and E. micans Hal. and many other species.—In all 12 species.

DIPTERA.—Identical species, on various authorities.*

Tipulariæ. Culex caspius Pallas (South Russ. and Bor. Am.) *Curtis.*—Cecidomyia tritici (Eur. and U. S.) *Harris,* &c.—Limnophila fasciata Schummel (Eur. and N. A.) *Osten Sacken.*—Limnobia rivosa Lin. (Eur. and Greenl.) *O. Fabr.*—Trichocera regelationis Lin. (Eur. and Greenl.) *O. Fabr.*—Simulium reptans Lin. (Eur. and Greenl.) *O. Fabr.*—**Tabanidæ.** Chrysops sepulchralis Zett. (Eur. and H. B. T.) *Walker.*—**Asilidæ.** Dasypogon teutonus Lin. (Eur. and Flor.) *Macquart.*—Laphria flavescens Macq. (Eur. and Carolina.) *Macquart.*—**Bombyliarii.** Anthrax nycthomera Hoffm. (Eur. and Georg.) *Macquart.*—Bombylius major Lin. (Eur. and N. A.) *Walker.*†—**Empidæ.** Empis borealis Lin. (Eur. and Greenl.) *O. Fabr.*—Hemerodromia precatoria Meig. (Eur. and H. B. T.) *Walker.*—Drapetis nigra Meig. (Eur. and H. B. T.) *Walker.*—**Syrphici.** Chrysotoxum fasciolatum DeG. (Eur. and H. B. T.) *Walker.*‡—Syrphus gracilis Meig. (Eur. and N. Y.) *Walker.*—S. granditarsus Först. (Eur. and H. B. T.) *Walker.*—S. guttatus Meig. (Eur. and H. B. T.) *Walker.*—S. hieroglyphicus Meig. (Eur. and Nov. Sc.) *Walker.*—S. maculosus Meig. (Eur. and H. B. T.) *Walker.*—S. menthastri Lin. (Eur. and N. A.) *Walker.*—S. ribesii Fabr. (Eur. and Bor. Am.) *Walker.*—S. scalaris Fabr. (Eur. and U. S.) *Walker.*—S. scriptus Lin. (Eur. and Nov. Sc.) *Walker.*—S. topiarius Meig. (Eur. and N. A.) *Walker* and *Stæger.*—S. umbellatarum Fabr. (Eur. and N. Sc.) *Walker.*—Sericomyia lappona Lin. (Eur. and Greenl.) *O. Fabr.*—Helophilus grœnlandicus O. Fabr. (Lapl. and Greenl.) *O. Fabr.* and *Stæger.*—Volucella obesa Fabr. (S. A., N. A., Asia, Africa.) *Macquart,* &c.—V. plumata Fabr. (Eur. and Newfoundland.) *Macquart.*—**Œstracidæ.** Œstrus tarandi Lin. (Eur. and Bor. Am.) *Beauv.*—Gastrus hæmorrhoidalis Lin. (Eur. and New Eng.) *Harris.*—G. nasalis Lin. (Eur. and N. Y.) *Fitch.*—G. pecorum Fabr. (Eur. and Jamaica.) *Walker.*—**Muscidæ.** Gymnosoma rotundata Lin. (Eur. and Mass.) *Harris.*§—Tachina distincta R. D. (Eur. and Philad.) *Rob. Desv.*—Gonia auriceps Meig. (Eur., Georg. and Afr.) *Walker.*—Sarcophaga carnaria Lin. (Eur. and Mass.) *Harris.*—S. mortuarum Lin. (Eur. and Greenl.)

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* **A great many species included in Loew's first list had been previously recognized as identical by other authors, and are omitted here.**

† Probably B. fraterculus Wied. in Loew's third list.

‡ Probably the *sp. indescr.* in Loew's third list.

§ Probably G. par Walk. in Loew's third list.

O. Fabr.—Musca cadaverina Lin. (Eur. and N. Y.) *Fitch.*—M. cæsar Lin. (Eur. and N. Y.) *Fitch* and *Walker.*—M. corvina Fabr. (Eur. and Nov. Sc.) *Walker.*—M. lepida R. D. (France and Philad.) *Rob. Desv.*—M. regina Meig. (Eur. and N. A.) *Harris.*—M. vespillo Fab. (Eur. and Nov. Sc.) *Walker.*—M. vomitoria Lin. (Eur and Mass.) *Harris.*—Anthomyia campestris R. D. (Eur. and N. A.) *Rob. Desv.*—A. ciliata Meig. (Eur. and Greenl.) *Stæger.*—A. irritans Meig. (Eur. and Greenl.) *Stæger.*—A. ruficeps Meig. (Eur. and Greenl.) *Stæger.*—A. saltatrix R. D. (Eur. and N. Am.) *Rob. Desv.*—A. striolata Meig. (Eur. and Greenl.) *Stæger.*—Cordylura hæmorrhoidalis Meig. (Eur. and Greenl.) *Stæger.*—C. pubera Lin. (Eur. and H. B. T.) *Walker.*—Scatophaga fucorum Meig. (Eur. and Bor. Am.) *Curtis.*—Sc. litorea Meig. (Eur. and Greenl.) *Stæger.*—Sc. scybalaria Lin. (Eur. and Greenl.) *O. Fabr.*—Ortalis cerasi Lin. (Eur. and Mass.) *Harris.*—Sepsis cylindrica Fabr. (Eur. and Mass.) *Harris.*—Lauxania Elisæ Weid. (Eur. and U. S.) *Walker.*—Lonchæa tarsata Fall. (Eur. and H. B. T.) *Walker.*—Calobata albimana Meig. (Asia and U. S.) *Macquart* and *Walker.**—Tetanocera elata Lin. (Eur. and Bor. Am.) *Walker.*—Heteromyza buccata Fall. (Eur. & N. Sc.) *Walker.*—Notiphila nitidula Fall. (Eur. and H. B. T.) *Walker.*—Ephydra stagnalis Meig. (Eur. and Greenl.) *Stæger.*—Drosophila cellaris Lin. (Eur. and N. Sc.) *Walker.*—D. funebris Meig. (Eur. and N. A.) *Macquart.*†—Phora aterrima Fabr. (Eur. and H. B. T.) *Walker.*—Ph. fuscipes Macq. (Eur. and H. B. T.) *Walker.*—Ph. rufipes Fabr. (Eur. and H. B. T.) *Walker.*—In all 71 species.

DIPTERA.—Species quoted as allied or of doubtful identity in Osten Sacken's Paper on Limnobina.

Limnobia (dicranomyia) morio Fabr. (Eur. and N. Y.)—Limnobia tristigma O. S. (Ill.) and L. tripunctata Meig. (Eur.)—Amalopis inconstans O. S. (U. S.) and Limnobia littoralis (Eur.)—Several N. A. sp. of Trichocera are also referred to (p. 242) as apparently identical with European species.—In all 3 species.

It will be seen from the above that no less than 36 authors—viz., placing them in alphabetical order, Beauvois, Boisduval, Clemens, Curtis, Dejean, Rob. Desvoidy, Doubleday, D'Urban, Edwards, Erichson, Otto Fabricius, Fitch, Godart, Grote, Guénee, Hagen, Harris, Hübner, Kirby, Klug, LeConte, Loew, Macquart, Mannerheim, Melsheimer, Menétries, Morris, Mulsant, Norton, Osten Sacken, Saussure, Schaum, Stæger, Stainton, Uhler and Walker—have testified to the existence in the Old and New Worlds of identical forms which cannot be supposed to have been introduced. Whether we decide by the number of the names, or by the great scientific weight of very many of them, the balance of authority is certainly against Prof. Agassiz.

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* Can this be Heteroneura albimana (no author) of Loew's first list.?

† Probably the *sp. indescr.* in Loew's third list.

In some few of the above cases it is demonstrable that distinctions, such as are generally considered to be of specific value, exist between the forms found in the New and in the Old World. There can also be little doubt that some of the above species have been introduced into North America, but how many and which and where and when, it is generally impossible to say. In regard to the three butterflies asserted by Agassiz to have been introduced, it seems difficult to understand how *Vanessa Atalanta*, the larva of which feeds on the nettle, or *V. cardui*, the larva of which feeds on the thistle, could have been imported by human agency into North America. Do men import nettles and thistles? Even supposing that by some strange chance the eggs of these butterflies reached North America in a living state, by what unaccountable concatenation of events did it happen, that they were glued to a growing and living nettle or to a growing and living thistle? For every breeder of Lepidoptera knows, that it is necessary for the young larvæ to have at hand, immediately that they are hatched, a supply of their appropriate food, and that their senses do not enable them to discover that food, even if it lies only a few inches removed from them. Besides, in the case of *cardui*, it is necessary to account not only for its introduction by human agency into North America, but for its dispersion by the same agency nearly over the whole globe. As to *Antiopa*, the larva of which feeds on poplar-leaves, it may possibly have been introduced in the egg state along with young poplars; but there is a remarkable fact, not generally known, which makes against such a hypothesis. The chief foreign commerce of the United States even at the present day, and more especially so in former times, is and was with England. If imported at all, therefore, *Antiopa* was in all probability imported from England. Now British specimens of this butterfly belong to a distinct variety, with the border of the wings always white and not cream-colored; and specimens found in North America and on the Continent of Europe belong to another variety, with the border of the wings always cream-colored and not white. Whence it follows that, if imported at all, *Antiopa* in all probability must have been imported, not from England, but from the Continent of Europe, with which in colonial times this country held no commercial intercourse at all, and in later times comparatively but little.

If it had so happened that the variety of *Antiopa* with a white border to its wings was peculiar to North America, instead of being peculiar to England, how eagerly the fact would have been seized on by Prof. Agassiz and his school, as a proof that the supposed American variety was a distinct species! Truly says Loew, that forms which, if they had been found in Europe, would certainly have been considered as only slight varieties of other well-known European species, as their only deviation consists in a slight difference of coloring, when found in America are immediately pronounced to be distinct species. (*Amber-diptera*, p. 318.)

To investigate the probability or possibility of each particular insect, claimed to have been introduced into North America, having been in reality so introduced, would, however, be an endless task. It is sufficient to remark that if one single species, of the 304 asserted by various authors to be common to the New and Old Worlds, is indigenous in each of these two habitats, then, as a necessary consequence, the assertion of Prof. Agassiz, that our insect Fauna "differs specifically throughout" from that of Europe, falls to the ground.

It may be asked why Agassiz should have asserted so confidently that *all* the insects of the temperate zone of North America differ specifically from those of Europe. The answer is, that he believes in the theory of many contemporaneous local creations, or to use his own language, "that animals must have originated where they live, and have remained almost precisely within the same limits ever since they were created, except in a few cases, where, under the influence of man, those limits have been extended over large areas." (*Lake Superior*, p. 248.) Let us see where such a theory will lead us in the case of the geographical distribution of Coleoptera within the limits of the United States.

"The whole region of the United States," says Dr. LeConte, "is divided by meridional or nearly meridional lines into three, or perhaps four, great zoological districts, distinguished each by numerous peculiar genera and species, which, with few exceptions, do not extend into the contiguous districts. The Eastern one of these extends from the Atlantic Ocean to the arid prairies on the west of Iowa, Missouri and Arkansas. * * The Central District extends from the western limit of the Eastern District perhaps to the mass of the Sierra Nevada of California; * * but it is very probable that this region does in reality constitute two districts bounded by the Rocky Mountains. The Western District is the maritime slope of the continent to the Pacific, and thus includes California, Oregon and Washington territories.

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"The method of distribution of species in the Atlantic and Pacific Districts, as already observed by me in various memoirs, is entirely different. In the Atlantic District a large number of species are distributed over a large extent of country; many species are of rare occurrence, and in passing over a distance of several hundred miles, but a small variation will be found in the species obtained. In the Pacific District, a small number of species are confined to a small region of country; most species occur in considerable numbers, and in travelling even one hundred miles, it is found that the most abundant species *are replaced by others, in many instances very similar to them.* * * In the Central District, consisting as it does to a very large extent of deserts, the distribution seems to be of a moderate number of species over a large extent of country, with a considerable admixture of local species." (LeC. *Col. Ks. and East. N. Mex.*, Oct. 1859, pp. iii—v.)

Assuming the correctness of these data and of the theory of Agassiz, it follows that there must have been at least three separate and distinct coleopterous creations within the limits of the United States. Nay, further. As on the Pacific slope, according to LeConte, every hundred miles that you travel you come upon a new coleopterous fauna, there must have been about twenty or thirty separate and distinct coleopterous creations there. For it is absurd to suppose that the Coleoptera, peculiar to each local district of 100 miles square, were formerly common to the whole territory and have all taken their origin from one common centre of creation. It would be as rational to believe, what Agassiz scouts as absurd, that all the faunas of the whole world were created simultaneously, with all their present specific and generic distinctions, in one common centre of creation, and thence spread themselves in locally distinct groups over the whole face of the globe, leaving no trace behind of the path travelled over by them in arriving at their present habitats.

When we take into account that the same reasoning which applies to North America applies also to other parts of the world, and that almost every little oceanic island has its peculiar species of insects, if we accept Prof. Agassiz's theory we shall be compelled to believe, that there must have been many hundred or even thousand distinct Creations within the present geological era. It may possibly have been so: but views like these certainly do not harmonize with such demonstrable entomological facts, as the existence of identical indigenous species in faunas separated by a wide expanse of ocean, and they seem scarcely consistent with the grandeur and simplicity of Nature.

If, rejecting the Creative theory, we assume the Derivative Origin of Species, how simple and intelligible become the great facts of the geographical distribution of species! How easily we can explain the existence of what are known as representative or analogous species, and the occasional existence of identical species, with all the intermediate grades between the two categories, in distinct entomological provinces separated by insurmountable physical barriers, such as are North America and Europe! What Loew remarks of Diptera is, so far as my personal knowledge of the entomological faunæ of England and Illinois extends, equally true of the other Orders of Insects. "The European and the American dipterous faunæ," says he, "always appear to me like two branches of the same stock, each having had a development of its own, very similar however to the development of the other. But if there really was such a common stock for both, it is to be sought among the Diptera of a former geological period, and if the European and the North American dipterous faunæ are to be considered as branches of this stock, the necessary inference would be that at a former period Europe and America had a continental connection. Are the Amber-diptera preserved fragments of this common stock? Did a continental connection between Europe and America really exist at the time when they lived? Did the submersion of an Atlantis tear asunder the branches of this stock?" (*Amber-diptera*, p. 324.)

In another passage Loew remarks, in regard to the resemblance between European and especially North American Diptera and those of the Amber Fauna, that "the relationship between certain species is so strikingly close, that it naturally suggests the idea of a genetic connection, and maintains it against all possible theoretical objections The impression that the living species, connected by such a close link of relationship to some Amber Diptera, are not new additions to the number of old species, but are, so to say, the transformed old species, is in my opinion irresistible to any unprejudiced observer." (*Ibid.* p. 315.)

II. As Prof. Agassiz has gone out of his way, in his recent "Methods of Study," to offer what he seems to consider as a refutation of Darwin's views on the Derivative Origin of Species, I may be allowed here a few words, in order to demonstrate that he has totally misapprehended and misstated the Darwinian Theory, and appears never even to have given himself the trouble to read Darwin's book through. It is evident, indeed, from his language, that he has approached that book with the same feelings as many men approach a toad or a spider, viz. as something scarcely worthy his notice and disgustful to every rightly constituted mind. "If," he says, (p. 303,) "such views are ever to deserve serious consideration," &c. "They are repugnant," he adds, (p. 317,) "to our better nature." This may be a very good reason for not reading a book, but it is a very poor reason for attempting to refute it without first reading it carefully through at least once. The conservative President of the Linnæan Society in England has recently expressed the opinion, in his Annual Address, "that the tide of opinion among philosophic naturalists is setting strongly in favor of Mr. Darwin's Theory." Some of the first naturalists of the day, for instance, Hooker, Herbert, Huxley, Owen, Lyell, Bates, Wallace, Isidore St. Hilaire, Naudin and as we have just seen Loew, advocate the same or very similar opinions. The "Origin of Species" is a strong book, well weighed and carefully thought out, written by a strong man familiar with all the discoveries of modern science and himself the honored author of many new scientific discoveries. It is utterly impossible, even for a naturalist of such distinguished attainments as Prof. Agassiz, to upset this new theory, like a child's house built out of cards, by the mere weight of his personal authority. Least of all will it answer to set up a man of straw, call it the Darwinian theory, and amuse himself with pulling it to pieces.

It is certainly true that in the "Methods of Study" Mr. Darwin's name is not especially mentioned, in connection with the Theory which it is attempted to refute. But as "the variability of species under domestication" is repeatedly and prominently alluded to in that book, as having been "urged with great persistency in recent discussions upon this subject" (p. 141, &c.), and Mr. Darwin was the first and only naturalist that made the phenomena of variability under domestication the leading feature in the question, and as moreover it is well understood among the disciples of Prof. Agassiz, that his blows are aimed at the "Origin of Species," it is impossible not to draw the inference that it is to that book that he more especially refers. The mere fact of his quoting in his Preface, *totidem verbis*, in connection with the theory which he proposes to refute, a remarkable phrase first used by Darwin in the "Origin of Species"—"the Imperfection of the Geological Record" —would, alone, be not only moral, but almost legal proof, that it is against the "Origin of Species" that his arguments are chiefly directed. In one word, if he does not refer to that book, to what book can he refer?

In order to substantiate the grave charge made just now against Prof. Agassiz, viz. that he has fundamentally misstated the views of his opponent, it will be necessary to state briefly what the Darwinian Theory really is. Its leading principles may be thus condensed:—

1*st*. Most species, both of animals and plants, vary more or less, whether they are in a state of domestication or in a state of nature.

2*nd*. In the case of domesticated species, man often seizes hold of any given variation that is useful or pleasing, not to the animal or plant, but to himself; and by selecting those individuals that possess that given variation in ever so small a degree, and breeding exclusively from them, gradually, on the well-known principle that "like produces like," or what naturalists call the Law of Inheritance, exaggerates the variation till it assumes very large proportions. Thus from the wild rock-pigeon have been gradually produced the different breeds of fancy pigeons—tumblers, carriers, fantails, &c.—some of which, as Darwin truly observes, differ so widely from the others, that if discovered in a wild state they would be considered by ornithologists as not only specifically but generically distinct.—This process may be called Artificial Selection.

3*rd*. In the case of wild species, Nature seizes hold of any given variation that is useful, not to man, but to the animal or plant itself. And as from the natural rate of increase in every known species, very many more individuals come into the world than can possibly survive to maturity, those individuals that are possessed of this useful variation gain an advantage over their fellows in the Struggle for Existence, and are thus enabled to jostle them on one side and take their places. By a repetition of this process in successive generations the given variation is gradually, by the workings of the Law of Inheritance exaggerated and swelled into large proportions, until after an indefinitely long period what we call a new species is formed.—This process Mr. Darwin calls Natural Selection.

So far is Mr. Darwin from adopting the old theory, that new species of animals and plants arise *merely and entirely or even chiefly* from what naturalists call the Conditions of Life, i. e. different food, different climate, &c., that he expressly on eight distinct occasions repudiates that theory. Hear him :—

Naturalists continually refer to *external conditions, such as climate, food,* &c., as the only possible cause of variation. In one very limited sense, as we shall hereafter see, this may be true; *but it is preposterous to attribute to mere external conditions* the structure, for instance, of the woodpecker, with its feet, tail, beak and tongue so admirably adapted to catch insects under the bark of trees. (*Origin of Species*, p. 11, Amer. ed.)

Some little effect may perhaps be attributed to the direct action of the *external conditions of life*, and some little to habit; but he would be a bold man who would account by such agencies for the differences of a dray and race-horse, a grayhound and bloodhound, a carrier and tumbler pigeon. (*Ibid.* p. 33.)

In looking at many small points of difference between species, which, as far as our ignorance permits us to judge, seem to be quite unimportant, we must not forget that *climate, food,* &c. probably produce some *slight and direct effect.* (*Ibid.* p. 81.)

How much direct effect *difference of climate, food,* &c. produces on any being is extremely doubtful. My impression is, that the effect is *extremely small* in the case of animals, but perhaps rather more in that of plants. (*Ibid.* p. 121.)

We should remember that *climate, food,* &c. probably have *some little direct influence* on the organization. (*Ibid.* p. 175.)

I fully admit that many structures are of no direct use to their possessors. *Physical conditions* have probably had *some little effect* on structure, quite independently of any good thus gained. (*Ibid.* p. 178.)

The dissimilarity of the inhabitants of different regions may be attributed to modification through Natural Selection, *and in a quite subordinate degree* to the direct influence of *different physical conditions.* (*Ibid.* p. 305.)

The complex and little known laws governing variation are the same, as far as we can see, with the laws which have governed the production of so-called specific forms. In both cases *physical conditions* seem to have produced *but little direct effect.* (*Ibid.* 410.)

It has thus been shown briefly what Darwin's Theory really is. It has also been shown, by numerous quotations from his book, what he expressly states that it is not. It shall now be shown from Prof. Agassiz's book, that it is assumed by that writer to be the very thing which Darwin had repeatedly stated it not to be.

> It surely does not follow that because the Chinese can, under abnormal conditions, produce a variety of fantastic shapes in the Golden Carp, therefore *water or the physical conditions established in the water* can create a Fish, any more than it follows that because they can dwarf a tree, or alter its aspect, by stunting its growth in one direction and forcing it in another, therefore *the earth, or the physical conditions connected with their growth,* can create a Pine, an Oak, a Birch or a Maple. I confess that in all the arguments derived from the phenomena of domestication, to prove that animals owe their origin and diversity to *the natural action of the conditions under which they live,* the conclusion does not seem to me to follow logically from the premises. (*Meth. St.*, p. 145.)

It may be added here, that from one end to the other of this book not one solitary word is said about Natural Selection, the Struggle for Existence, or any of the other great leading features of the "Origin of Species," in any shape, manner or form. The whole argument is ignored as completely as if it had never been promulgated; and, as we have already seen, an old, exploded doctrine which Darwin expressly disavows on eight separate occasions, is set up as a target for the dialectic arrows of Prof. Agassiz. Five entire pages (pp. 141–5) are expended in proving triumphantly what nobody denies, and what follows as a necessary consequence from Mr. Darwin's views, viz. that the characters that distinguish wild species are different from those which distinguish domesticated breeds. Surely, if they were *not* different, it would be a fatal objection to Mr. Darwin's theory. The former characters, according to that theory, arise from variations useful to the animal or plant itself; the latter from variations useful or pleasing, not to the animal or plant itself, but to man. We should naturally therefore, arguing *a priori*, expect them to be different as a general rule. Who, that is not bewildered by a preconceived theory, would expect to find in a wild pear the luscious, melting, sweet pulp, which man has gradually produced by Artificial Selection in the cultivated fruit? Or to find in a wolf the disposition to point game, instead of rushing greedily upon it, which man by artificial training, by Artificial Selection, and by the Law of Inheritance, has gradually produced in the Pointer-dog? Or to find a species of wild sheep with a tail so large and fat, that it has to be supported by a little wagon, as in certain exotic breeds of tame sheep?

That it may not be said that I rely upon a single isolated passage, to substantiate the grave charge brought against Prof. Agassiz, I will quote a second passage to the same effect.

> The influence of man upon animals is, in other words, the action of mind upon them; and yet the ordinary mode of arguing upon this subject is, that because the intelligence of man has been able to produce certain varieties in domesticated animals, therefore *physical causes* have produced all the diversity existing among wild ones. Surely the sounder logic would be to infer, that, because our finite intelligence may cause the original pattern to vary by some slight shades of difference, therefore a superior intelligence must have established all the boundless diversity of which our boasted varieties are but the faintest echo. (*Meth. St.*, p. 142.)

To my mind, the sound logical inference from the above premises would be, that "a superior intelligence *must have caused the original pattern to vary by very great differences*, of which our boasted varieties are but the faintest echo," which is precisely the Darwinian doctrine. But the passage is quoted, not for the sake of criticising its logic, but to prove how utterly the views of Mr. Darwin, or what must be supposed to be those of Mr. Darwin, are misapprehended and misstated.

In opposition to the principles of the Darwinian theory, as expounded above, Prof. Agassiz says, that "there is not a fact known to science tending to show that any being, in the natural process of reproduction and multiplication, has ever diverged from the course natural to its kind" (p. 281); and that the naturalist "never sees any animal diverge in the slightest degree from its own structural character" (p. 318). Now Hagen has shown satisfactorily that the European *Onychogomphus forcipatus* and *Cordulegaster annulatus* diverge most remarkably in their structural characters, in certain localities, from the normal type, and that all the intermediate grades occur in other localities. (*Mon. Gomph.* pp. 28—40, and Plate 2; pp. 333—7, and Plate 17.) Loew has shown the same thing of the European *Gymnopternus Sahlbergii* and *Empis maculata* (*Amber-Dipt.* p. 323); and similar cases are familiar to every well-informed entomologist. Prof. Agassiz may perhaps argue in such instances as these that it is natural to them to diverge thus, and that in diverging thus "they do not diverge from the course natural to them." But by this mode of arguing in a circle we may prove that no conceivable amount of divergence, that does really occur in a given species, is a divergence from nature.

From what Agassiz says, as to the "close adherence to the distinct, well-defined and invariable limits of the species", in wild species as contra-distinguished from domesticated ones, (*Meth. Study*, p. 145,) any one not familiar with Natural History would infer, that wild species, in the same geographical locality, scarcely vary at all from the normal type. Every field-entomologist knows that, in many species of insects, this is not so. To illustrate from one single Order, Coleoptera: —*Arrhenodes septentrionis* Hbst. and *Catogenus rufus* Fabr., vary exceedingly in size, so that some individuals are full twice as long as others, and in the male of the former of these two species the snout is sometimes full as broad as long, and sometimes on the other hand full twice as long as broad, whence some foreign entomologists have been led to consider the varieties as distinct species. But as numerous intermediate grades occur in all these cases in company with each other, it is evident that the differing forms are mere varieties. Again, as regards the variable length of what are commonly called horns in insects, I have ♂ specimens of *Phanæus carnifex* Lin. with the horn that proceeds from the vertex three times as long as in other specimens, with all the intermediate grades; and the length of the thoracic horns in ♂ *Phellidius* (*boletophagus*) *cornutus* Fabr. and of the mandibles in ♂ *Lucanus elaphus* Lin. is almost equally variable. Finally, to give a few examples of colorational variation, in *Haltica striolata* Fabr many individuals occur with the pale elytral vitta resolved into two roundish pale spots, so that Fabricius described them as a distinct species under the name of *bipustulata*. In *Haltica alternata* Illig. some specimens have the normal 5 black vittæ on the elytra, and some have perfectly immaculate elytra, with all the intermediate grades. In *Cerotoma caminea* Fabr. some specimens have the two normal discoidal black spots of each elytrum confluent so as to form a black vitta, and I have a single specimen with the elytra entirely immaculate except the triangular black spot on the scutel, and a similar one with faint traces only of the normal markings; and analogous variations occur in *Œdionychis quercata* Fab., *Œ. 6-maculata* Illig. and *Blepharida rhois* Forst. In *Melasoma* (*lina*) *interrupta* Fabr. some specimens have the elytra almost entirely yellow with only 4 small black dots, some with 16 more or less large black spots which are more or less confluent, and some entirely black with the exception of a narrow marginal line. In ***Myzia*** ***15-punctata*** Oliv., in the mature living insect, the elytra vary from pale yellowish through different shades of brick-red to so dark a reddish brown that the black spots are with difficulty discernible. And, as I can state from a long series of specimens formerly in my collection in England, the European *Donacia Proteus* varies in color from indigo blue through purple and violet to bright ruby red, and so on to metallic yellow, metallic yellowish brown, reddish brown and brown. There is no domesticated animal that exhibits anything like so great a range of variation in its coloration. The simple fact that naturalists are puzzled every day to decide in the case of wild species, whether differing forms are varieties or species, proves that in a state of nature extensive variations do occur. To say that such variations are included in "the invariable limits of the species" is little else but an abuse of language.

It is very true that we cannot say whether any of these wonderful variations have arisen within a comparatively recent period. But this is simply because Natural History, as a science, dates only from the days of Linnæus. Of all the insects referred to by ancient writers, scarcely a single species can be identified with certainty from their loose and unsatisfactory notices, as we may learn from the interminable modern disputes as to the true significance of the ancient *Cossus*, *Cantharis*, *Cicindela*, *Œstrus*, *Buprestis*, &c. Even Linnæus and his immediate followers published no *descriptions* of species, in the modern sense of the term, but only meagre and imperfect *diagnoses*, whence it continually results that it is impossible to decide from the diagnoses themselves, to which of half a dozen distinct species their specific names are properly applicable. Twenty generations hence our descendants may begin to generalize on the permanence of specific types in insects. To attempt to do so now, is to build castles in the air. If we had full descriptions of any species dating from the days of Aristotle and Theophrastus, we might then form some estimate of the variability of those species within the last 2000 years. At present it is only possible for us to accumulate materials, upon which many centuries hence our remote posterity may begin to speculate. That insects never vary materially *in time*, no man can prove; but that they do sometimes vary most astonishingly *in space*, and run into what are known as geographical races, there is the fullest and most reliable evidence. To give another example, in addition to those already quoted:—*Calosoma luxatum* Say, *C. striatulum* Lec. and *C. Zimmermanni* Lec. were formerly considered by Dr. LeConte and others as perfectly distinct species. But Mr. Ulke tells me that "on showing a large series comprising all the intermediate grades—viz. from Kansas *luxatum* from Nebraska Idaho and Utah *striatulum*, and from Oregon and California *Zimmermanni*—to Dr. LeConte, he was then convinced of their identity," and they are accordingly in his recent List of N. A. Coleoptera classified as mere geographical races.

It is singular that in attempting to prove the immutability of *species*, from the historic evidence of "the animals preserved by the ancient Egyptians within their tombs or carved upon the walls of their monuments," besides "the Apis, the Ibis, the Crocodiles and the sacred Beetles," Agassiz quotes *the Negro* as "the same woolly-haired, thick-lipped, flat-nosed, dark-skinned being in the days of the Ramases that he is now." (*Meth. St.* p. 150.) Hence one of two consequences necessarily follows, either that, in the opinion of Prof. Agassiz, the negro is a distinct species of the genus Homo, or else, if he is merely a variety, that varieties are, in this one case at all events, as immutable as species, which destroys the whole force of the argument. It further follows, in the latter case, that there do exist such things as geographical divergences not only in coloration but in structural characters. As to the Sacred Beetles of the Egyptians, I am not aware that any specimens have ever been discovered preserved in mummies or sarcophagi, and the rude sculptures of them by ancient Egyptian artists which may be seen in the British Museum are so uncharacteristic, that not only is it utterly impossible to identify the species, but they might just as well pass for *Geotrupes* or even for *Nitidula* or *Philhydrus* as for *Canthon.* Prof. Agassiz must surely know, that it is sometimes impossible to identify insects specifically, even from the very best modern colored drawings, unassisted by descriptions. Is it likely then that they can be identified from sculptures of the rudest and most primitive character?

Instead of recognizing the demonstrable fact, that in a state of nature many species vary both in coloration and structural characters, not only in different geographical localities, but even in the same locality, Agassiz seems to suppose that variation and divergence from the normal type are peculiar to domesticated species. "Nature," he says, "holds inviolable the stamp that God has set upon his creatures; and if man is able to influence their organization in some slight degree, it is because the Creator has given to his [man's?] relations with the animals he [the Creator?] has intended for his [man's?] companions the same plasticity which he [the Creator?] has allowed to every other side of his [man's?] life." (*Meth. St.* p. 147.) So far as the meaning of this most obscure and mystical sentence can be guessed at, it is asserted that the Creator conferred the quality of variability upon such animals as he intended to be domesticated by man, but not upon those which he intended to run wild; and since the ass, the guinea-fowl, the honey-bee* and the silk-worm vary scarcely at all in a state of domestication, and certainly vary not one-hundredth part as much as many species which are not domesticated, it follows, according to what seems to be the doctrine of Prof. Agassiz, that the Creator never intended these animals to be domesticated, and consequently that any man that keeps them in a state of domestication violates the laws of God!

Herbert Spencer has remarked of Hugh Miller, that he "fell short of that highest faith, which knows that all truths must harmonize, and which is therefore content trustfully to follow the evidence whithersoever it leads." (*Illustr. Universal Progress.*) The more closely we examine the recorded opinions of Prof. Agassiz, the more inclined shall we become to believe, that there is the same radical defect in the constitution of his mind.

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* The Italian bee (*Apis ligustica* Spin.) is not a variety but a distinct species, and has been of late years extensively propagated in this country by introducing fertilized queens into hives of the ordinary species. Hence one interesting fact has already been arrived at, viz. that in the space of about 3 or 4 months the whole working population of the hive possessing an Italian queen comes to consist of the Italian species, whence it results that working bees live in the imago state only about 3 months. Virgil describes the queen-bee as marked with bright, golden spots, (*maculis auro squalentibus ardens,* Georg. iv. 91), so that it would seem that the Italian bee was the only species known to him. From not attending to the peculiar characters of this species, Kirby and Spence have denied the accuracy of Virgil's description. (*Introd.* Letter 19, p. 377.)

III. "There are many Insects," says Agassiz, "that pass through their metamorphoses within the egg, appearing as complete Insects at the moment of their birth; but the series of changes is nevertheless analogous to that of the Butterfly, whose existence as Worm, Chrysalis and Winged Insect is so well known to all. Take the Grasshopper for instance: with the exception of the wings it is born in the mature form; but within the egg it has had its Worm-like stage, as much as the Butterfly that we knew a few months ago as a Caterpillar." (*Methods of Study*, p. 237.)

For a long time I have noticed in the winter and spring, under the scales of a gall like a pine-cone growing on a species of willow, (*Salix cordata* Muhl., as kindly determined for me by Mr. M. S. Bebb of Washington,) and called *strobiloides* by Baron Osten Sacken, great numbers of singular, yellowish, cylindrical, exarticulate, semitransparent bodies, .16—.17 inch long, about seven times as long as wide, rounded at each end, and a little tapered towards what afterwards proved to be the anterior end. Sometimes in a single gall there were over a dozen of them, and I supposed them at first to be the pupal cocoons of some inquilinous *Cecidomyia*. When opened early in the spring, they contained nothing but an apparently homogeneous, subviscid, yellowish fluid, but about the beginning of May I noticed that egg-yellow matter had accumulated in their anterior half, and about the middle of May two large black eyes became visible in many specimens through the semitransparent external integument, about $\frac{1}{4}$ of the way from the anterior end. On May 26 there hatched out from two of these bodies, which I had insulated in a vial along with several score of others, little Orthoptera belonging to the genus *Orchelimum*, destitute of any vestiges of wings, but otherwise formed, as is usual, very much like the perfect insect. When first hatched, they were all pale green except the eyes, but they afterwards rapidly acquired blackish markings. I had long ago noticed that the imago of a species of *Orchelimum*, perhaps *glaberrimum* Burm., haunted another species of willow which grows in an entirely different locality—*Salix nigra* Marshall according to Mr. Bebb—but which bears no galls at all resembling *strobiloides* O. S. On carefully extracting the insect from an egg which showed the black eyes rather conspicuously, I discovered that its body was so much elongated, as it lay stretched out at full length in the egg, as to be about six times as long as wide, the insect occupying the entire egg except the anterior one-seventh part which was empty, and always making its exit by bursting or gnawing a slit through the shell of the egg just behind the empty part.

No doubt, before the legs of the little *orchelimum* were well developed, a lively imagination might have detected a strong resemblance between the embryo insect, as it lay in the egg, and the worm-like larva of many Lepidoptera. But are we thence to conclude that this worm-like stage in the egg is homologous to the worm-like larva state of Lepidoptera and other Orders of insects? Several facts seem to forbid such an inference.

1*st*. The egg of the Catydid (*Platyphyllum concavum* Harr.) of which egg I possess specimens and which is described by Harris, (*Inj. Ins.* p. 158,) is only about ½ longer than wide, and consequently the young Catydid can scarcely be elongate and worm-like in any stage in the egg, unless it is curled up head and tail together. But the egg of a species of Œdipoda which I once hatched out, (probably *Œ. Carolina* Lin ,) was about three times as long as wide, cylindrical and rounded at each end, and Harris describes the eggs of such *Gryllidæ* Leach (=*Locustariæ* Latr.) as oviposit in the earth, as being "elongated and nearly of an ellipsoidal form." (*Inj. Ins.* p. 156.) Consequently, as I know that the embryo *Orchelimum* is not curled up in the egg, and there is a regular gradation in the shape of the egg from *Orchelimum* to *Platyphyllum*, it is not probable that any Orthoptera Saltatoria can ever be curled up in the egg, as is the case with many Lepidoptera, the eggs of which are generally more or less spherical; whence we may conclude that the embryo Catydid is probably only about one-half longer than wide and is therefore not at all "worm-like."

2*nd*. Many lepidopterous larvæ are anything but worm-like. The larva of *Limacodes scapha* Harr. and generally all Limacodian larvæ, and the larva of *Papilio Podalirius* (Europe) which is said to be "snail-like," may be quoted as examples. Are we to conclude, therefore, that these larvæ pass their worm-like stage in the egg, like Grasshoppers, and are born as mature insects, with the exception of the wings? And if not, why not?

3*rd*. No insect moults its external integument, after assuming the pupa state, until its final change into the imago, and no imago moults at all. If then the young Grasshopper, when it leaves the egg, is a pupa, it will only moult once before it becomes an imago; and if, as Agassiz seems to assert, it is an imago when it leaves the egg, it will not moult at all. Now what are the facts? Westwood, the most invariably accurate of all modern entomologists, says that Orthoptera ordinarily moult six times, viz. four times in the larva state, once when they pass into the pupa state, and once when they pass into the imago state (*Intr.* I. p. 411); and this is pretty generally the rule with all insects. Indeed, if they do not moult after hatching out from the egg, how are they to grow? An insect has a horny skeleton on the outside to which its muscles are attached, just as a Crustacean has a calcareous skeleton on the outside to which its muscles are attached; and neither skeleton is susceptible of gradual enlargement, like the internal skeleton in Vertebrata, which is the reason of the well-known fact that the Imago in insects cannot grow. Hence, instead of *shedding their flesh and sitting in their bones*, as Sidney Smith proposed to do in hot weather, both are compelled from time to time to *shed their bones and sit in their flesh*, until Nature provides them with a new skeleton, which in its turn will be thrown off so soon as they have outgrown it.

4*th*. If the young Grasshopper, at the moment of its exclusion from the egg, was in the imago state, its reproductive system would be already fully developed and active. Every field-entomologist knows that it is not so, and that even with those species which in the imago have wings scarcely longer, though considerably broader, than in the pupa, the pupa is never found in copulation.

On the whole, considering the enormous variation in the shape of those larvæ, which even Prof. Agassiz will allow to be true larvæ and not mere wingless imagos, running through all the intermediate grades from the short, squat, almost spherical larva of *Copris Carolina* (*Proc. Ent. Soc. Philad.*, Vol. I, Plate I, fig. 1.) to the very elongated, worm-like larva of most *Elateridæ;* and considering also how loose and indefinite are such phrases as "worm-like," it seems rather unphilosophical to base a scientific theory upon so shifting a foundation.

IV. As we have seen that Prof. Agassiz traces a vague analogy between the larva state of insects and the true Worms, so he traces another vague analogy between the pupa or what he calls the Chrysalis state of insects and the Crustacea. (*Methods of Study*, pp. 237, 312.) But in Crustacea the head is soldered to the thorax without any suture, while in the pupa of Lepidoptera, Hymenoptera, Coleoptera, Diptera and the true Neuroptera, which even Agassiz does not assert to pass the larval and pupal states in the egg, the head is connected with the thorax by a very distinct connate suture, and in many Coleoptera, especially Tetramera, and most Hymenoptera and Neuroptera there is, in addition, a very distinct constriction or neck at this suture, thus offering not even the faintest resemblance to the Crustacean Cephalothorax. I say nothing of the other Orders or Suborders, where there exists a perfectly free suture between the head and the thorax of the pupa, because these are probably the very groups which Agassiz believes to pass the larval and pupal states in the egg. In another passage an analogy is traced between, on the one hand, the larva state of insects and the elongated, worm-like Centipedes, (Myriapoda,) and, on the other hand between the pupa state of insects and the spiders (Arachnida) with their head and thorax confluent as in the Crustaceans. (*Ibid*. pp. 75–6 and compare p. 312.) To this last analogy there is precisely the same fatal objection as to the first.*

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*There is a remarkable genus of ant-like spiders—whether described or not I dó not know, though it is not mentioned either by Latreille or Say—with a very strong medial constriction in the thorax so as to appear to have a distinct head. This seeming head is subquadrangular, and bears a small eye at each of the four angles and on the depressed frontal surface two enormously large ones, each nearly ½ as wide as the head, making six in all. But there is no connate suture or free articulation whatever at the constriction, as I ascertained from the recent specimen, and the front pair of legs arise from this seeming head and not from the other part of the thorax. The posterior pair of legs are much longer than the others, the other 3 pair alike in every respect. The palpi are about ½ as long as the front legs, 3-jointed, each successive joint slightly shorter than the preceding. The other parts of the mouth are small and indistinct. If undescribed, this genus may be called *Myrmecarachna*, from the great resemblance to the worker ant. In the Scorpionide genus Chelifer, also, of which I possess *Ch. oblongus* Say, the thorax is divided by two transverse slightly indented lines into 3 portions, the anterior one of which bears the eyes and the brachiform palpi and the other two portions the 4 pairs of legs.

V. In the course of this last speculation, one of the proofs offered is, that "the earliest condition of an animal cannot be its highest condition—it does not pass from a more perfect to a less perfect state of existence." (*Ibid.* p. 75.) This is generally, but not universally, true. Westwood has well observed that "the case of the bark-lice (coccidæ) clearly proves that annulose animals may exist, which become more and more imperfect as they approach the imago state;" and that in that state the females "lose all trace of articulations in the body as well as of articulated limbs, becoming in fact inert and fixed masses of animal matter, motionless and apparently senseless." (*Intr.* II. p. 444.) Again, in some genera of the Crustacean Cirripedes, (barnacles, &c.) according to Darwin, "the larvæ become developed either into hermaphrodites having the ordinary structure, or into what are called complemental males; and in the latter the development has assuredly been retrograde; for the male is a mere sack, which lives for a short time, and is destitute of mouth, stomach or other organ of importance, excepting for reproduction." (*Origin of Species*, p. 384.) Prof. Dana, who denies the theory of Agassiz that Lepidoptera are the highest insects, which is based upon the above assertion, and who maintains that Hymenoptera are the highest, quotes the adult, attached, plant-like condition of the defunctionate Barnacle or Anatifa, and of other species which become attached in the adult state, as another example of general decline in grade in the adult state. (*Silliman's Journal*, May, 1864, p. 19, note.) So far as regards the question of the relative superiority of the different Orders of Insects, it cannot, I think, be decided from the consideration of any one character, whether the nature of the metamorphosis upon which Agassiz chiefly relies, or the functions of the wings upon which Dana chiefly relies; but upon a general review of all the characters of each Order. The first method is artificial, the second natural.

VI. Prof. J. D. Dana has recently published an entirely new Classification of Insects, based, as he says, upon his new principle of Cephalization. (*Silliman's Journal*, Vol. 37, pp. 10—33.) The following Table represents in a condensed form the leading features of this very ingenious, but somewhat vague and indefinite arrangement.

PTEROPROSTHENICS.---Front wings not elytriform.

I. APIPENS.—Wings like those of a bee.
  1. **Hymenopters.** Perterrestrial. Permaturative.[*]
  2. **Dipters.** Mostly perterrestrial. Permaturative.
  3. **Aphanipters.** (Fleas.) Perterrestrial. Permaturative.

II. AMPLIPENS.—Wings large.
  1. **Lepidopters.** Perterrestrial. Permaturative.
  3. **Homopters.** Perterrestrial. Prematurative.
  3. **Trichopters.** (Phryganeids.) Semiaquatic. Permaturative.

III. ATTENUATES. (Neuropters.)---Body, legs and wings slender.
  1. **Apipenniforms.** Perterrestrial. Permaturative or prematurative.
    a. *Termitideans.* Hymenopteroid.
    b. *Panorpideans.* Dipteroid.
    c. *Group unknown.* Aphanipteroid.
  2. **Amplipenniforms.** Perterrestrial or semiaquatic. Permaturative or prematurative.
    a. *Planipennians.* Lepidopteroid. (Myrmeleontids, Hemerobiids, Nymphids,[†] Mantispids and Semblids.)
    b. *Psocideans.* Homopteroid.
    c. *Perlideans.* Trichopteroid.
  3. **Perattenuates** or Typical Neuropters. Semiaquatic. Prematurative.
    a. *Libellulideans.*
    b. *Ephemerideans.*

PTEROMETASTHENICS.---Front wings elytriform.

1. **Coleopters.** Mostly terrestrial. Permaturative.
2. **Hemipters.** (Heteropters and Pediculids.) Mostly terrestrial. Prematurative.
3. **Orthopters.** Terrestrial. Prematurative.
  a. *Cursors.* Coleopteroid. (Forficulids and Blattids.)
  b. *Ambulators.* Hemipteroid. (Mantids, Phasmids and Nirmids.)
  c. *Saltators* or typical Orthoptera.

THYSANURES or APTERS.---Wingless.

1. **Lepismians.**
2. **Podurians.**
2. **Unknown degradational group.**

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[*] By "perterrestrial" as opposed to semiaquatic," Prof. Dana means that the larva is not aquatic with aquatic respiration, and by "permaturative" as opposed to "prematurative" that the imago is altogether unlike the larva, or as it is commonly phrased, that the metamorphosis is complete.

[†] I am unable to conjecture what Neuropterous group is here referred to by the term "Nymphids." No such family or genus is mentioned either by Latreille, Westwood, Hagen or any other writer known to me. It cannot be the

"The number of subdivisions in the groups, both the lower and the higher," says Prof. Dana, "is *three*, as in most of the Classes and Orders that came under consideration in Article 1st." (p. 27.) Yes, but this symmetry is only obtained by making Aphaniptera (the fleas) of equal systematic value with Hymenoptera and Diptera, and Trichoptera of equal value with Lepidoptera and Homoptera; by splitting up what remains of Neuroptera, after removing Trichoptera, into three groups of equal value with Hymenoptera, Diptera, &c.; by placing Homoptera in the first Primary Division, and the closely allied Hemiptera (heteroptera) in the second Primary Division; by uniting Forficulidæ and Blattidæ together as Cursors, and Mantidæ and Phasmidæ together as Ambulators; and finally by assuming the existence of an unknown aphanipteroid group in the Apipenniform Attenuates, of an unknown degradational group in Aptera, and as it should seem, though Prof. Dana does not expressly say so, of a third unknown group, to complete the mystical number *three*, in the Perattenuate Attenuates.

I protest, in the name of science, against this arithmetical monomania, which is perpetually seeking to fetter the limbs of Nature in mathematical formulæ. The world has had about enough of ternary, quinary and septenary systems; but from the fatal facility with which they are generated, it does not seem likely that the breed of them will very soon run out. Nothing is easier than by subdividing some natural groups and uniting others, and by giving prominence to certain characters and keeping others in the back ground, to form an artificial system of classification based upon any assignable arithmetical number from *two* up to *ten*. And when such systems are formed, what are they worth? Absolutely nothing.

It is perhaps hypercritical to quarrel with a mere name, but we can scarcely fail to observe that this new system of Prof. Dana's is not, as it professes to be, based upon his principle of Cephalization. As originally expounded by him in Crustacea, Cephalization consists in "the transfer of the anterior members of the thorax to the cephalic series,"

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subfamily *Corydalides* West., because the "Nymphids" are classed as "perterrestrial," (p. 22.) The only other Neuropterous group left unnamed by Prof. Dana is *Rhaphidiidæ* Westw., which Hagen unites with *Sialina*=*Semblids* Dana, and *Embidina* Hagen, which had previously been referred to *Termitina*. Nymphidia is a genus of Butterflies.

(*Sill. Journ.*, Vol. 35, p. 66,) or in other words in *legs* being converted into *head-organs*. And in Crustacea this character really appears to be of high systematic value. It by no means follows, however, as every Naturalist is well aware, that because a character is of high systematic value in one group, it will be of equally high value, or of any value at all, in another group. The neuration of the wings is of high systematic value in most Orders of insects, but in Coleoptera it is utterly worthless, or at all events, according to LeConte, "no results of importance for classification have yet been obtained by the study of the venation of these organs." (*Intr. Col.* p. xviii.) Again, in Odonata the neuration is very constant in the same species and differs very much in different genera; whereas in the closely allied Perlina the neuration is very inconstant in the same species, insomuch that the number of subterminal cross-veins varies from 2 to 12 in different specimens of the same species (*Acroneuria abnormis* Newm.), and in the right and left wing of the same specimen there is sometimes a difference of 4 subterminal cross-veins, (*Acr. abnormis* Newm. and *Perla varians* Walsh); while on the other hand the neuration of this family differs comparatively but little in the different genera. Hence it results that in Odonata the neuration is of the highest systematic value, and in Perlina of much lower value.

If we apply the principle of Cephalization in its original signification to Insects, we shall find that there are certain families and genera, e. g. in Orthoptera *Mantidæ*, in Neuroptera *Mantispa*, in Heteroptera *Myodocha*, *Phymata*, *Macrocephalus*, *Syrtis*, *Reduviidæ* and *Nepidæ*, and in Diptera *Hemerodromia*, which have what are commonly known as raptorial front legs; in other words the front legs are used, not as *legs* but as *arms* to catch their prey with. In other species, e. g. the dipterous *Calobata antennæpes* Say, which takes its name from that peculiarity, and in many Nemocerous Diptera, the front legs are not used at all for locomotive purposes, but are elevated in the air and vibrated after the fashion of antennæ. Here therefore it is strictly true that "the anterior members of the thorax are transferred to the cephalic series;" and if, as Prof. Dana maintains, the cephalization of the anterior pair of limbs in Man, or in other words the conversion of his front limbs into arms, "places Man apart from the whole series of Mammals" (*Sill. Journ.*, Vol. 35, p. 68), then by parity of reasoning, if the principle of

Cephalization is universally applicable, all the above-mentioned families and genera of Insects ought to be placed in a group by themselves.

Instead of doing this, however, Prof. Dana has based his new Classification primarily, not upon the functions of the front legs, of which he takes no notice whatever, but upon the functions of the wings, according to the greater or less degree in which the front wings are thickened, so as to perform the function, not of wings, but of elytra or wing-cases. It is difficult to see how, even in Coleoptera where the front wings are completely useless for flying and merely serve to protect the hind wings in repose, those organs are any more "cephalized" or converted into head-organs than in his Pteroprosthenics. At all events, if Coleoptera are inferior to Diptera, because their flying organs are placed further back from the head, Diptera must be superior to Hymenoptera, because the Dipterous wing is placed one half-segment nearer to the head than the central point common to the front and hind wing in Hymenoptera; whereas, according to this new system, Hymenoptera are superior to Diptera.

The minor divisions of this system are based either upon loose, indefinite, unexplained resemblances, such as that of the wings of the Apipens to the wings of a bee, the Aphanipterous Apipens having only the merest rudiments of wings, or upon vague statements of the comparative largeness of the wings or the comparative slimness of the body and its appendages, (Amplipens and Attenuates,) which although generally are by no means universally true—witness the narrow, lanceolate, almost thread-like wings of many Microlepidopterous Amplipens, and the short, robust bodies of the Psocidian Attenuates—or finally upon fanciful analogies, which are occasionally founded upon the erroneous statements of preceding authors, as will be hereafter shown in the case of Perlina. In none of these minor divisions is there any attempt whatever made to trace any connection with the head, and therefore, so far as they are concerned, the name of Cephalization is certainly a misnomer.

But allowing that the more or less partial conversion of the front wings into elytra amounts to a decephalization, and allowing still further that the character of cephalization is of high systematic value in Insecta, surely instead of classing Hemiptera (heteroptera) as inferior to Coleoptera, and Orthoptera as inferior to Hemiptera, we ought to adopt the exactly opposite arrangement. For Coleoptera have the front wings entirely elytriform, Hemiptera (heteroptera) only about one-half elytriform, and Orthoptera scarcely or but slightly elytriform. These groups therefore, according to Dana's own principles, ought to stand 1 Orthoptera, 2 Hemiptera, 3 Coleoptera, instead of 1 Coleoptera, 2 Hemiptera, 3 Orthoptera. But this would necessitate the abandonment of the idea, that the Cursorial Orthopters are coleopteroid and the Ambulatorial Orthopters hemipteroid, or else destroy the symmetry of the analogies that run through the whole system. Consequently, for the sake of symmetry, the very principle upon which the whole system professes to be founded, has been violated.

Although Prof. Dana takes no notice whatever of the above-mentioned very remarkable "Cephalization" of the front legs in certain families and genera of insects, he observes that "as there are *ptero*prosthenic and *ptero*metasthenic insects, so there are *podo*prosthenic, or those in which the anterior legs are stronger than the posterior, and *podo*metasthenic, or those in which the posterior are the main organs of locomotion. Fleas and grasshoppers," he continues, "as they use their hind legs for leaping, are examples of the latter; and this sthenic difference in the feet, though of less weight as a mark of grade than that in the wings, is of real value among inferior subdivisions," (p. 14.) He subsequently remarks that the fact of the Grasshoppers, &c. (Orthoptera Saltatoria) "being strongly podometasthenic is a mark of low inferiority," (p. 25.)

It is observable that in the single Order Coleoptera, the genus Laccophilus in the family Dytiscidæ, the genus Scirtes in the family Dascyllidæ, the genus Orchesia in the family Melandryidæ, the genus Orchestes in the family Curculionidæ, the whole subfamily Halticidæ, and the genus Blepharida in the family Chrysomelidæ, are all "podometasthenic" and have thickened and saltatorial hind legs. If this peculiarity is really, as Dana asserts, "a mark of low inferiority," it is singular that it should occur in Coleoptera in so apparently capricious a manner. Even when it runs through a whole subfamily, as in Halticidæ, it would be difficult to give any other reason than the absence of saltatory power, why Galerucidæ, which do not jump, are superior to the very closely allied Halticidæ, which jump vigorously.

VII. As might be naturally expected from the fact that Entomology is not Prof. Dana's speciality, there are a few slightly erroneous statements scattered here and there throughout his Paper, some of which I shall now proceed to notice.

1. The wings of Apipens are said to be "free from scales and other defunctionating appendages or impediments," and to be "rapid in motion," (p. 15.) But the wings of the Dipterous *Cecidomyia*, for example, are covered with short, appressed hairs and ciliated with long hairs, and the Nemocerous genera *Erioptera* (woolly-wings) and *Lasioptera* (shaggy-wings) take their names from similar peculiarities; and Loew well remarks that "most nemocerous diptera are poor fliers." (*Amber-diptera*, p. 308.)

2. "Hymenoptera," we are told, "are the most uniform in shape or size of Apipens. * * Among them there are no imitations of the forms in other tribes, while they are extensively copied after—a characteristic peculiar to a type of the very highest grade," (p. 15.) Surely Aphaniptera (the fleas) are far more uniform in shape and size than Hymenoptera, which run from two inches long to an almost microscopic minuteness. Again, if names prove anything in this rather indefinite and imaginative matter of imitative forms, there is among the bees a *Xylocopa tabaniformis* Smith, among the ants a *Cryptocerus araneolus* Sm., among the fossorial wasps a *Mutilla arachnoides* Sm. and *M. araneoides* Sm., and among the Ichneumons an *Amitus aleurodinus* Hald.

3. A passage from a Paper by A. S. Packard, Jr., is quoted with approbation, (p. 16, note,) in which that writer, referring to *Laphria**

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* Say remarks of the genus *Laphria* that "the larvæ live probably in the earth," and Westwood says generally of *Asilidæ* that "the larvæ reside under ground and feed on the roots of plants." (Say I. p. 11, and Westw. *Intr.* II. p. 549.) I have bred many specimens of *Laphria fulvicauda* Say, from pupæ which occurred sparingly under the bark of black oaks which had been felled a year or more. This species therefore cannot feed in the larva state on living vegetable matter, and probably feeds on subcortical larvæ. As a general rule, I believe that species that are insectivorous in the imago state, which it is well known that the *Asilidæ* are, are insectivorous in the larva state also; though there are whole groups, e. g. *Ichneumonidæ*, that are insectivorous in the larva state but feed in the imago state on honey and pollen. Some day or other, when the practical importance of Economic Entomology shall be more generally recognized, this matter of insectivorous larvæ will be more carefully looked into.

as an imitative or "synthetic" type of *Bombus*, observes that "*Laphria* closely apes the humble-bee in its form, coloration, size and flight, even to the buzz which is, if anything, still louder. * * The plump bee-like form and the dense yellow and black hirsuties, which cause them to be mistaken for humble-bees by persons unacquainted with their structural differences, are just those features that are exceptional in the Diptera and are normal in the Hymenoptera." But, 1*st*, a "plump, bee-like form" is by no means universal in all *Laphria*, as may be seen at once from the figures in the sixth Plate in Say's Works. 2*nd*. The colors yellow and black are by no means universal in all *Bombus*. Several European species, e. g. *B. lapidarius* Fabr., are rufous and black, and a dozen N. A. species described in Mr. Cresson's Paper are partly reddish. 3*rd*. The colors yellow and black are by no means universal in all *Laphria*. In some, e. g. *L. fulvicauda* Say and *L. saniosa* Say, the colors are fulvous and black or sanguineous and black, and some are all black with short cinereous hairs, as *L. dorsata* Say and *L. macrocera* Say. 4*th*. "Hirsuties" is by means universal in all *Laphria*. *L. dorsata* Say, as may be readily seen from Say's figure, is nearly smooth. Mr. Packard seems to have had in his mind only two or three species of *Laphria*—*thoracica* Fabr., *flavicollis* Say and *tergissa* Say, the last of which certainly "buzzes" very much like a *Bombus*—when he established his sweeping generalizations. 5*th*. Instead of "hirsuties" being the *rule* in Hymenoptera it is the *exception*, neither would it be a very easy matter to prove that there are more hairy species in Hymenoptera than in Diptera, especially if we take into account the extensive bristly family of *Tachinadæ*. The great bulk of Hymenoptera, whether we consider the number of genera or of species, belong to the Parasitic families, *Ichneumonidæ*, *Chalcididæ*, *Proctotrupidæ*, &c., and I do not know a single species of them that is at all hairy. The only hairy Tenthredinidous genus that I am acquainted with is *Trichiosoma*. *Uroceridæ* and *Cynipidæ* are none of them hairy, nor, so far as I am aware, are any of the Fossorial Wasps or the Ants or the true Wasps hirsute, except a few *Scoliidæ* and *Mutillidæ*, which are slightly so. Even among the bees, which Mr. Packard seems to have had exclusively in view, there are, as is well known, whole groups which have no "hirsuties" whatever. Neither is it the case, if we look through all the families, that "plumpness" is any more characteristic of Hymenoptera than of Diptera. I know no Dipteron that comes anywhere near the very elongate and attenuate form of the Hymenopterous *Pelecinus polycerator* ♀ Drury.

I do not wish to be understood here as doubting or denying the fact of there being often a very striking resemblance between insects belonging to different Orders and different families of the same Order, but only the assumption that is made, that of two similar forms, A and B, it is B that imitates A, not A that imitates B, and the inference drawn therefrom, that the group to which A belongs is superior to that to which B belongs. Because an *Ægeria* is named *bombiformis*, it is concluded that it is *Ægeria* that imitates *Bombus*, not *Bombus* that imitates *Ægeria;* but when a Dipterous genus is named *Bittacomorpha* from the Neuropterous genus *Bittacus*, the corresponding conclusion that the Dipteron imitates the Neuropteron is passed over in silence. The Dipterous *Toxophora ægeriiformis* Westw., as its name denotes, imitates an *Ægeria;* but according to Dana's theory, it must be the *Ægeria* that imitates the *Toxophora*, not the *Toxophora* that imitates the *Ægeria*. All that we can safely say in this matter is what Latreille said long ago, viz. that "Nature seems to work after a certain limited number of patterns, which she reproduces with modifications in widely distinct classes and orders;" (quoted Westw. *Intr.* I. p. 326, note); in other words, to drop all metaphorical language, that there appears to be a genetic connection between widely removed species of the same subkingdom. That this iteration of peculiar types is sometimes confined to single species, is proved by the fact of the long, uniquely-shaped tail in the hind wings of a North American moth, *Attacus luna* Linn., being exactly reproduced in the hind wing of a North American butterfly, *Hesperia (gonilaba) proteus* Godart, the other *Attacus* having no vestiges of any tail and the other *Goniloba* having only a short rudimental one. The great truth, which was foreshadowed years ago by the illustrious French entomologist, is also deducible from a fact which Prof. Dana has well insisted on, viz. that in the several Classes and Orders of Annulata there exist definite limits of size, within which each is confined, and which differ materially in the different Classes and in the different Orders. Still more obvious is this law in the case of the inferior subdivisions, such as families, subfamilies and genera; and the lower down in the series we go, or in other words the closer the genetic connection becomes, the narrower become the limits within which each group is confined. The coleopterous genus *Lucanus*, for instance, varies in length from about 2 to 1 inch, while the coleopterous genus *Trichopteryx* never exceeds $\frac{1}{20}$ inch in length. Unless we are satisfied with Uncle Toby's philosophy, that it has pleased God to make them so, it is difficult to conceive of any possible reason, why, if every species was independently created, there should not exist *Lucanus* as small as *Trichopteryx*, and *Trichopteryx* as large as *Lucanus*.

There is another assumption often made by writers in regard to this matter of imitative forms, which I think is equally unsupported by facts. Several parasitic insects have a strong general resemblance to the insects upon which they are parasitic, though in a Natural Classification they are widely distinct, e. g. certain species of *Volucella* and *Bombus*. Hence it is inferred that the parasite is mistaken by the insect upon which it preys for an individual of its own species. (Kirby & Sp. *Intr.*, Letter 21, p. 407.) But to assume this is to assume, not only that insects are far more stupid than from long observation I believe them to be, but also that the senses of Annulata are homologous to the senses of Vertebrata, whereas such facts as Bees flying home in a straight line through the densest forests and male moths flying down chimneys to reach their females, prove that some of their senses at all events must be constructed on a different type. There is no proof whatever that substances which seem to us exactly of the same color appear to insects of the same color. The yellow hairs of one insect may to them seem red and the yellow hairs of another blue, just as certain human eyes are what is called "color-blind," and by candle-light to most of us blue appears to be green. The *Volucella* certainly looks like a *Bombus* in our eyes, but it by no means follows that it looks like a *Bombus* in the many-facetted organs, which we call eyes, of the *Bombus* itself. Just so, the stars in the firmament appear, it is said, in our eyes like the luminous dots in the Ovarian egg, but it by no means follows, as Agassiz suggests, that in the eyes of an Omnipresent Creator, which are not subject as ours are to the laws of perspective, the stars in the firmament have such an appearance, and therefore that "the thoughts which have been embodied in the universe are recalled within the little egg." (*Methods of Study*, p. 288.) Of the whole number of parasitic insects certainly not one in a hundred resembles in our eyes the insect it preys on, and the fact of the hundredth parasite being alike may well be attributed to chance, or to speak with more precision to the genetic connection between all Annulata. If "imitative" forms only occurred in parasitical families in such species as prey upon the species which they imitate, there would be more plausibility in the common hypothesis; but it is not so. *Conops sagittaria* Say, as Harris has remarked, (*Inj. Ins.* p. 611,) "might almost be mistaken for a *Eumenes*," and in the shape of its abdomen *Conops* also recalls the fossorial genus *Trypoxylon* and the ♂ of the Evaniide genus *Pelecinus*. But instead of *Conops* being parasitic upon *Eumenes* or *Trypoxylon*, or *Pelecinus*, all known *Conops* are parasitic upon the very dissimilar family of bees and especially humblebees, with the exception of two species, which are parasitic upon fossorial wasps, but not upon *Trypoxylon* or *Eumenes*, but upon *Pompilus* and *Odynerus*, to which they bear but small resemblance. (West. *Intr.* II. p. 560–1. Saunders *Trans. Ent. Soc. London*, n. s. Vol. 4, Pl. 28. St. Farg. *Hymen.* I. p. 456.) Again, it was long ago remarked that the Dipterous genus *Systropus* strongly resembles the Hymenopterous genus *Ammophila*, and so it certainly does. (West. *Intr.* II. p. 543.) But *Systropus macer* Lw., or as I wrongly named it *Conops analis?* Fabr., instead of being parasitic on *Ammophila*, as the common theory would lead us to suppose, is parasitic, as I have shown, on an insect that is altogether unlike a Systropus, and does not even belong to the Order Hymenoptera but to the Lepidopterous Heterocera. (See my Paper *Proc. B. S. N. H.*, Feb. 1864, p. 300.)

When I here speak of parasitic insects, I distinctly exclude those which are sometimes called parasites, but more correctly Inquilines or Guest-flies, such as the inquilinous Cynipidæ, certain inquilinous Cecidomyia of which I shall have more to say on a future occasion, the Apide genus Cœlioxys and the Bombide genus Apathus. (See my Paper on Cynipidæ, *Proc. Ent. Soc. Philad.* II. p. 478.) Here resemblance of form and color is accompanied by a close systematic affinity, which is scarcely ever the case with the true Parasites. Hence I conceive it to be perfectly possible that the *Bombus* may mistake the *Apathus* for an individual of its own species, but that it can so mistake the Dipterous *Volucella*, I do not believe.* It is a remarkable fact that the Coleopterous *Rhipiphorus paradoxus* (Europe) which is parasitic in the nests of *Vespa vulgaris*, and the Lepidopterous *Galleria cereana* which inhabits the nests of another social insect, the common honey-bee, are as unlike the insects among which they live as it is possible to conceive.

4. The food of Diptera and of Coleoptera is said to be "vegetable, articulate-animal or vertebrate-animal," (pp. 17, 24.) In the case of a

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* As illustrative of the possibility of *Bombus* mistaking *Apathus* for its own species, I may quote here a remarkable fact, which I witnessed the very day (Sept. 20) that I received the proof sheets of the above.—Noticing what I supposed to be a ♀ *Apathus elatus* Fabr. surmounted by a ♂ on the flower of a thistle, but not in actual copulation, and having long sought for the ♀ of that species in vain, though the ♂ ♂ occur here by hundred, I wrapt them both up in my handkerchief and took them straight home. On turning them loose into a glass vessel. the ♂ in the course of a few minutes again surmounted the ♀, but all his amorous caresses could not induce her to withdraw the tip of her anus from under her abdomen. In about five or ten minutes, he desisted and released his hold; when on killing them I was astonished. and disappointed withal, to find that the supposed ♀ *Apathus elatus* was nothing but a ♀ *Bombus fervidus* Fab., so fresh and bright that it evidently belonged to the newly-hatched autumnal brood. I could scarcely believe my own eyes when I saw the pollen-basket, the tooth on the first tarsal joint of the hind leg, the anus directed backwards in death. and the broad, obcuneiform, striated mandibles of the ♀, and the convex hind tibiæ, covered with short, dense, stubbly bristles, and devoid of any polished spot or long lateral fringe, in the ♂. Although the caresses of the incestuous lover were firmly repelled, yet there was evidently no anger or hostility on the part of the lady; for she made no attempt either to bite or to sting him, though she had abundant opportunity to do either. It is remarkable that, so far as known at present, this species of *Apathus* does not occur in the nests of *B. fervidus*, which it so closely resembles, but in the nests of a very dissimilar species, *B. pensylvanicus* DeGeer. (Cresson *Proc. Ent. Soc. Phil.* II. p. 164.)—I may add here, that as I have recently captured 17 ♂ ♂ of *Apathus citrinus* Smith in company with 4 ♀ ♀ of *A. laboriosus* Fabr., and as the ♀ of the former and the ♂ of the latter species appear to be unknown, I incline to believe them to be the sexes of one and the same species. In that case the ♂ having the dorsal base of his abdomen *yellow*, and the ♀ *black*, finds a partial parallel in ♂ ♀ *B. pensylvanicus*. In the genus *Apathus*, as in many others, (*Proc. Ent. Soc. Phil.* II. p. 223,) the ♂ ♂ seem to preponderate greatly over the ♀ ♀; so that it is very improbable, that I should find as many as four ♀ ♀ of *A. laboriosus* and not a single ♂ in company with them, which must have been the case if *laboriosus* and *citrinus* are distinct species.

larva belonging to the Dipterous genus Tabanus, I have shown that the food is molluscous-animal, for it feeds upon aquatic snails. (*Proc. B. S. N. H.*, Feb. 1864, p. 302.) In the case of the European glow-worms (Coleoptera) it is also molluscous-animal, for they feed upon land-snails. (Westw. *Intr.* I. p. 250.) Again, it is said of Hymenoptera that "their food is either vegetable or articulate-animal, not vertebrate-animal; the animal food being thus the same in kind with the material to be made of it, just as among Mammals the highest of carnivorous species live on the flesh of Mammals, and only the lower on fish and insects" (p. 16). But it is well known that in Europe the common wasp, *Vespa vulgaris* Lin., habitually carries off butchers' meat, (Westw. *Intr.* II. p. 246,) and consequently the food of this genus, which is generally allowed to be one of the highest Hymenoptera, is partly vertebrate-animal.

5. There is a little confusion in the text as to the "prematurative" or "permaturative" character of the Homopters and the Trichopters. The Table (p. 15) correctly gives the first as "prematurative" and the second as "permaturative"; but afterwards (p. 18) it is said of the Amplipens that "those of the highest division are permaturative and the rest are prematurative", whence it results that the Trichopters are prematurative, which they certainly are not. Again, it is said of the Attenuates (p. 20) that "the mouth, unlike that of the Lepidopters and Homopters, but like that of most of their larves, is not suctorial but mandibulate," whence it results that the Homopters are in the larva state mandibulate (!) and consequently must be prematurative, as the imago is correctly said to be haustellate.

6. The Perlideans are said to be like the Phryganeans in "living in a sheath" in the larva state (p. 22). This erroneous statement originated with Reaumur, and was copied by a host of closet-naturalists, but finally explained and corrected by Westwood. (*Intr.* II. pp. 22–3.) I can add my testimony to Westwood's, having seen thousands of the larvæ of many different species of Perlina, crawling about naked on the under surface of submerged stones.

7. The Saltators are said to show that they are the typical Orthopters "by the absence of any close likeness to other groups," (p. 25.) But Westwood mentions several species belonging to the Cricket family, "which singularly represent coleopterous insects." (*Intr.* I. p. 450.)

8. In this system, as we have seen, the Lepidopters are classified as "perterrestrial" and the Hemipters (Heteroptera) as "mostly terrestrial." But the larvæ of some Lepidoptera are aquatic with aquatic respiration, (see Westw. *Intr.* II. p. 400 and Harris *Inj. Ins.* p. 476); and those Heteroptera which inhabit the water (Nepidæ and Notonectidæ) breathe through spiracles in all their states and never through branchiæ. They are not therefore semiaquatic or aquatic, in the sense given to these terms by Prof. Dana. Consequently the Lepidopters should have been classified as "perterrestrial or semiaquatic," and the Hemipters as "perterrestrial."

9. The Trichopterous larvæ (Phryganeina) are said to "spin silk-like fibres from the extremity of the abdomen, or the lip, or both" (p. 30). So far as regards their ever spinning from the extremity of the abdomen, I doubt this statement very much. It is contrary to analogy that larvæ belonging to the same family of insects should spin, sometimes from the mouth like other larvæ, and sometimes from the anus like spiders. Westwood says that "they spin from the mouth in the same manner as caterpillars." (*Intr.* II. p. 62.) I know from personal observation that the larvæ of the Ichneumonide genus *Brachygaster* spin from the mouth, having seen a group of them actually engaged in spinning their singular symmetrical masses of cocoons. The only true insect known to spin from the anus, so far as I recollect, is not a larva but a Coleopterous imago—the European *Hydrophilus piceus*, which strongly resembles our *H. triangularis* Say, but is several sizes larger. It would be interesting to know whether the American species has the same remarkable habit. (See Westw. *Intr.* I. p. 124.)

ROCK ISLAND, ILLINOIS, July 21, 1864.

Descriptions of three new species of LIMACODES.

BY TRYON REAKIRT.

1. **Limacodes Lorquini**, nov. sp.

Male. Expanse 1⅜ inches. Fore wings. An irregular reddish-brown basal patch; a broad curved brownish border on the outer margin, marked with a dark brown line interiorly, following which, a row of indistinct lunules, lighter in color than the rest of the space. The nervules traversing this marginal band are faintly lined with brown; a large pea-green spot occupies the whole remaining surface of the wing. Ciliæ, brownish, except on the median portion of the inner border, where they become green. Hind wings, light fawn-color, immaculate; ciliæ very long, lighter than the wing. Below, the fore wings, are reddish-brown on the costa and outer margin; a faint green tinge towards the inner margin. Hind wings, as above, and thickly powdered with brownish atoms. Antennæ, pale ferruginous; thorax, green; abdomen, yellowish. Below, the face, thorax and legs are reddish-brown.

Female. Expanse 1½ inches. It is chiefly colored the same as the male, but the disposition of its markings vary. The basal patch is larger and darker; the terminal border is very wide, occupying fully two-fifths of the surface, edged inwardly with a very heavy brown line, extending from a point on the costa, one-third its length, to a little more than one-third the length of the inner margin; this line, though curved centrally, being perpendicular through its extremities to the inner margin; the nervules are very distinctly outlined in brown, but all are suddenly excised before reaching the margin. Ciliæ, dark brown. Hind wings, resembling the male. Below, as in the male, but is reddish on the costa only, of the primaries, and is destitute of any atoms on the hind wings. Antennæ, reddish-brown; face and thorax green; abdomen and legs, brown, the former, with a few scattering greenish hairs on the upper surface.

Philippine Islands.—Mr. E. F. Lorquin. I take pleasure in dedicating this fine species to the esteemed gentleman from whom I received it, and who has also furnished me with an exceedingly valuable suite of Philippine Island Lepidoptera.

L. Lorquini bears a strong resemblance to a local species, to be described hereafter, though it is a much larger and more fully developed insect; it must be regarded as the eastern representative of our species.

2. **Limacodes viridus,** nov. sp.

Male? Expanse .94 inch. Fore wings. A dark brown spot, at the base extends inwardly to the submedian nervure, follows it for one-fourth its length, then crosses, parallel with the outer margin to the costa, which is also brown. A broad light brown marginal band, traversed by darker nervures, the inner boundary of which is a rich brown-velvety line, darkest towards the inner angle, and also parallel with the margin. The rest of the area is pea-green. Hind wings, fawn color, shading into a dark brown along the margin. Below, greenish-yellow on the fore, and pale fawn on the hind wings. Antennæ, brown; thorax, green; face, abdomen and legs, brown.

Female. Expanse 1.06 inches. Fore wings. A dark brown semi-elliptical broad patch on the costa, curving inwardly a little beyond the median nervure; the remainder of the surface excepting a brown marginal border, is pea-green. This border widens towards the inner angle, the nervures being distinctly lined with dark brown, and has a dark spot, near its middle, extending along the margin. Hind wings, fawn colored. Under surface and body resembling the male.

The *Larva*, I can describe approximately only, having neglected to fully observe its ornation. It was about three-fourths of an inch long; general color brown. Its body rises very abruptly and broad from the head, which is rounded, thence tapering gradually, until within a short distance of the tail, where it as suddenly descends, terminating in a sharp point. There are three distinct dorsal ridges, each being furnished with clusters and spinules.

It feeds on the chestnut, and may be found during September. Coccoon, about half an inch long is spun on the midrib of a leaf, oval, shining, brownish-black; the imago appears in May.

Philadelphia.—Much resembles the preceding species.

3. **Limacodes minuta,** nov. sp.

Male and *female*, are alike in color, the last being the largest. Male expanse 5 lines, female 5½ lines. Fore wings, lustrous, brownish-yellow; hind wings, blackish-brown. Below, testaceous, with a black shade, and roseate along the costa of primaries. Antennæ, thorax, abdomen and legs ochreous-yellow.

Egg. Length ⅕ line, pale green, a black ring near one end, oblong.

Larva. Length 2 to 2½ lines; basal outline elliptical; a flattened ridge widened in the centre, extends from head to tail, curving over vertical elevations at the sides, which gradually diminish before and behind, and terminate at both ends in a rounded margin.

Around the base, a row of small, densely spined papulæ, two of which, on the head, are the most prominent, and colored yellow. The body is smooth, but the ridge is thrown into thick fleshy folds; it is thickest in the middle, whence it diminishes anteriorly and posteriorly.

Green; two bright red lines, of equal length, cross each other at right angles, on the central portion of the upper ridge.

Pupation. They spin their coccoon in October on one of the small veins of a leaf; it is one line long, oval, dark brown, and shining.

Food Plants, the oak and chestnut on which they may be found during August and September. The imago appears about June.

I collected the larva of this most diminutive species of the genus, two years ago, and by singular good fortune, carried them successfully through all their transformations. It belongs to the same group as the European *asellus*, to which it is also closely related.

Philadelphia.

Descriptions of new North American COLEOPTERA.

BY JAS. H. B. BLAND.

OTHNIUS FASCIATUS, n. sp.

Body piceous, shining; elytra fulvous, with brownish markings.

Hab. Virginia. (Coll. Ent. Soc. Phila.)

Head shining, deeply punctured, clothed with golden pubescence; clypeus, and in front of the eyes, rufous; between the eyes, piceous-brown; eyes black; palpi fulvous; antennæ, 3rd joint equal in length to the 4th, 5th and 6th combined. Thorax piceous, shining, deeply punctured; lateral margins nearly straight; anterior and basal margins slightly rufous. Scutellum dark brown. Elytra closely punctured, clothed with yellowish pubescence; humeri prominent; a brownish spot between the humerus and scutellum; a dark brown band on the lateral margins, diverging to the suture on the centre, forming an uneven transverse band; posterior fourth dark brown, with a small fulvous dot confluent with the suture; tip fulvous; beneath piceous. coarsely punctured, ventral segments reddish-brown. Legs fulvous. Length 1¾—2¼ lines.

From E T. Cresson.

PRISTOSCELIS ATRUS, n. sp.

Black, coarsely punctured, clothed with ashy pubescence.

Hab. California. (Coll. Ent. Soc. Phila.)

Black; head opaque, closely and finely punctured, depressed between the antennæ, clothed with ash-colored pubescence and sparse black hair; mandibles rufous at the base, black at tip; palpi black; surrounding the mouth, reddish-brown; antennæ black, 4th and following joints clothed with ashy pubescence. Thorax transverse, convex, closely punctured, shining; lateral margins slightly rounded, angles obtuse. Elytra depressed at base between the humerus and scutellum; coarsely punctured; shining, irregularly clothed with ash-colored pubescence; humeri prominent, glabrous, sides almost straight, rounded suddenly to tip; epipleuræ slightly reflexed; beneath thickly clothed with ash-colored pubescence, finely punctured. Legs: femora and tibiæ black; tarsi dark rufous. Length 2¼ lines.

From Mr. H. Ulke.

PRISTOSCELIS FULVO-TARSIS, n. sp.

Piceous-bronze; shining, coarsely punctured, clothed with grayish pubescence; tibiæ and tarsi fulvous.

Hab. California. (Coll. Ent. Soc. Phila.)

Head black, shining, finely punctured; clothed with grayish pubescence; antennæ and mouth piceous. Thorax slightly wider than long, coarsely punctured. angles obtuse; lateral margins much rounded. Scutellum rounded at the tip. Elytra rugosely punctured, dorsal surface slightly flattened; densely pubescent; sides parallel, rounded suddenly to the tip; beneath black, well clothed with pubescence; minutely punctured. Legs: femora piceous; tibiæ and tarsi fulvous. Length 1¼ line.

From Mr. H. Ulke.

PRISTOSCELIS NIGRICORNIS, n. sp.

Black, somewhat shining, punctured, clothed with short grayish pubescence; legs piceous.

Hab. Kansas. (Coll. Ent. Soc. Phila.)

Head closely punctured, depressed at the side of each antenna, forming a central ridge or tubercle, becoming obsolete before reaching the vertex which is much flattened and uneven; antennæ black; mouth piceous. Thorax closely punctured, slightly wider than long, a trifle narrower in front; lateral margins much rounded, posterior angles obtuse. Elytra coarsely punctured; humeri prominent, well clothed with a short gray pubescence; slightly wider behind the middle, tip obtusely rounded; beneath, minutely punctured, moderately clothed with gray pubescence. Legs piceous. Length $\frac{1}{14}$ of an inch.

PEDILUS CYANIPENNIS, n. sp.

Body black; antennæ dark yellow; elytra dark blue; tarsi light yellow.

Hab. Virginia. (Coll. Ent. Soc. Phila.)

Head black, shining, clothed with erect light-colored hair; antennæ pale fulvous at the base, becoming darker towards the tip; palpi pale yellow; mandibles piceous. Thorax black, shining, clothed with erect hair. Elytra dark blue, neatly and closely punctured; humeri prominent, covered with light brown hair; beneath black, shining, glabrous in the centre of the head back of the gular suture, punctured back of the eyes; prothorax in the centre sparsely punctured, transversely rugose towards the lateral margins; remaining portions of under-surface minutely and closely punctured. Legs punctured, clothed with grayish pubescence; femora piceous; trochanters, tibiæ and tarsi, yellowish. Length 3¼ lines.

LEPTURA ATRO-VITTATA, n. sp.

Body testaceous; clothed with golden pubescence; antennæ annulated; elytra with three broad black vittæ.

Hab. New Jersey. (Coll. Ent. Soc. Phila.)

Head closely punctured, well clothed with golden pubescence, deeply impressed in the centre; central line very distinct, dividing one-fourth from the frontal margin, thence running obliquely to the base of the mandibles; anterior margin slightly elevated; labrum, the anterior half of the clypeus, tips of the mandibles, and the palpi, piceous; collar black; basal joint of the antennæ obscurely annulated, 2nd and 3rd joints black, the following joints more or less annulated with fulvous. Thorax very closely punctured, clothed with golden pubescence, regularly narrowed from the base to the apex; anterior margin elevated, posterior angles divergent; central line distinct; on each side of the middle a large, round, black spot; surface suddenly depressed near the base, forming a transverse sinuate line; base bi-emarginate; sides furnished with an obtuse tubercle. Scutellum black, triangular. Elytra very closely punctured; each elytron with two broad black vittæ, one confluent with the suture, extending along the suture from the base to slightly over one-half the length of the elytra; the outer vittæ extends from the tip to very near the base; the vittæ are covered with a blackish pubescence; epipleuræ testaceous, except near the tip, which is widely separated and obliquely truncate, the outer point of the tip prolongated into an acute spine; beneath testaceous, minutely punctured, clothed with golden pubescence; head, back of the gular suture deeply excavated; margin of the episterna of the metathorax, and posterior coxal plates, piceous; tips of the femora and tibiæ black; tibiæ armed with two long acute spurs; tarsi black. Length 8¾ lines.

From J. H. B. Bland.

EPILACHNA MACULIVENTRIS, n. sp.

Fulvous; sùbopaque, each elytron marked with eight black spots.

Hab. Rocky Mountains, Colorado Territory. (Coll. Ent. Soc. Phila.)

Body fulvous, subopaque, clothed with yellowish pubescence; head closely punctured, eyes black, mandibles black; antennæ light yellow, terminal joints brownish. Thorax densely punctured, about twice as wide as long, densely punctured, lateral margins slightly rounded, somewhat narrowed in front; lateral margins dark brown. Scutellum black. Elytra densely punctured, each elytron marked with eight black spots in the following order: three near the base, the central one slightly nearer the tip, three on the centre forming a transverse row, two on posterior fourth, the lateral spot nearest the tip; the spot on the humerus is elevated and somewhat shining; epipleuræ brownish; beneath, roughly punctured; prothorax fulvous; mesothorax, metathorax and the 1th to 4th of the abdominal segments piceous; a fulvous lateral spot on the 1st, 2nd, 3rd and 4th abdominal segments; two apical segments and legs fulvous. Length 3½ lines.

Two specimens examined, in one of which the thorax is slightly darker on the disk above.

From Mr. Chas. Wilt.

Descriptions of North American HYMENOPTERA, in the Collection of the Entomological Society of Philadelphia.

BY E. T. CRESSON.

(*Continued from page* 196.)

ICHNEUMONIDÆ.

Genus **MESOLEPTUS**, Grav.

SECTION 1.	—Scutellum and abdomen black, margins of the segments sometimes pale	Sp. 1— 7
" 2.	—Scutellum black, abdomen red or red and black	Sp. 8—25
" 3.	—Scutellum pale or red, abdomen red, or red and black, or yellowish	Sp. 26—30

SECTION 1.

1. **Mesoleptus major**, n. sp.

Opaque-black; legs dull rufous; wings hyaline, areolet small, subtriangular and petiolated.

Male.—Opaque-black, clothed with a thin, very fine, short, whitish pubescence, especially obvious on the face; mandibles entirely black; palpi pale; antennæ rather more than half the length of the body, entirely black; tegulæ also black; metathorax finely scabrous, somewhat longitudinally sulcate behind and with a transverse, rather ill-defined carina at base. Wings hyaline, slightly iridescent, nervures and stigma black, the former pale at base; areolet minute, subtriangular, petiolated. Legs dull rufous, all the coxæ and trochanters black. Abdomen elongate, slender, subfusiform; the first segment slender at base, swollen and convex at tip, shining; apical segments broad and subcompressed. Length 4½ lines; expanse of wings 6½ lines.

Hab.—Delaware. Dr. Thos. B. Wilson.

This species makes an oval cocoon, 4 lines long and 2 broad, of a dirty white color with a broad black transverse band near each end.

2. **Mesoleptus annulipes**, n. sp.

Black; spot on mandibles, palpi, tegulæ, 4 anterior coxæ, all the trochanters and annulus on posterior tibiæ, whitish; wings hyaline, areolet minute, oblique, petiolated.

Female.—Black, clothed with a thin, fine whitish pubescence, more obvious on the face; spot on each mandible and the palpi, whitish; antennæ nearly as long as the body, entirely black; tegulæ whitish; metathorax with the elevated lines well defined, the central area large and subrhomboidal. Wings hyaline, beautifully iridescent; nervures and stigma black, the former pale at base; areolet minute, oblique and petiolated. Legs pale rufous, the four anterior coxæ and all the trochanters whitish; posterior coxæ and tarsi black, the latter whitish at base, the posterior tibiæ white with broad black band at tip and another near the base. Abdomen elongate, slender at base, broad and compressed at tip, the first segment slender at base, swollen and convex at tip; apex of abdomen truncate, the ovipositor subexserted. Length 3½ lines; expanse of wings 5½ lines.

Hab.—Canada West. Mr. B. Billings, Jr.

Resembles *M? validus*, but is at once distinguished from that species by the minute, petiolated areolet of the wings, by the more compressed abdomen, the shorter ovipositor and the different coloration of the legs.

This species makes an elongate-ovate cocoon, 4 lines long by 1½ wide, of a pure white color, with a rather broad black band near each end.

3. **Mesoleptus? validus**, n. sp.

Black; wings hyaline, areolet triangular; legs pale rufous, the posterior tibiæ and tarsi annulated with black and white; basal segment of abdomen much dilated at tip.

Female.—Black, rather shining, robust, slightly pubescent; head and antennæ entirely black, the latter nearly as long as the body; tegulæ pale testaceous; metathorax sulcate behind and transversely aciculate, the elevated lines distinct, the central area not defined. Wings hyaline, nervures and stigma blackish, the former pale at base; areolet rather large, subtriangular, subpetiolated. Legs pale rufous, the four anterior tibiæ and tarsi in front, yellowish-white; posterior coxæ and their trochanters above, black, their tibiæ whitish with a broad black annulus at tip and a narrow one near the base, their tarsi black with the base of the first three joints whitish. Abdomen robust, subfusiform, entirely black; first segment slender at base and much dilated at tip; apical segments broad and subcompressed; ovipositor exserted nearly the whole length of the body, piceous. Length 4 lines; expanse of wings 6 lines.

Male.—Resembles the female, except that the antennæ are longer and the abdomen subcylindric.

Hab.—Pennsylvania. Mr. C. A. Blake.

This may not belong to *Mesoleptus* on account of its long ovipositor and robust basal segment of the abdomen, otherwise it has the characters of that genus.

4. **Mesoleptus tibiator**, n. sp.

Black; most of mandibles, palpi, tegulæ and trochanters, yellowish-white; legs pale yellowish-red, the posterior tibiæ and tarsi black, the former with a broad whitish band; wings hyaline, areolet minute, subtriangular, petiolated.

Male.—Black, opaque, thinly clothed with whitish pubescence, more obvious on the face; most of the mandibles, and the palpi, yellowish-white; antennæ as long or nearly as long as the body, black; tegulæ yellowish-white; metathorax with the elevated lines well defined, the central area moderate, subrotundate. Wings hyaline, iridescent; nervures and stigma fuscous; areolet minute, subtriangular, slightly oblique and petiolated. Legs pale yellowish-red, the trochanters pale yellowish-white, the posterior coxæ entirely black or dull rufous more or less tinged with blackish, their tibiæ black, with a broad whitish band on the middle, their tarsi also black with their extreme base whitish. Abdomen black, slender at base, rather broad and compressed at tip; first segment gradually dilated at the apex, sometimes the apical margin of the 2nd segment is obscurely pale; ventral segments stained with yellowish. Length 2½—3 lines; expanse of wings 4—4½ lines.

Hab.—New Jersey (Cresson); Illinois (Dr. Lewis).

Much smaller than *M. annulipes* to which it is closely allied.

5. **Mesoleptus dubitatus**, n. sp.

Black; most of mandibles, palpi and tegulæ, yellowish-white; legs in most part and the apical margins of abdominal segments, dull rufous; wings hyaline, areolet subtriangular, petiolated.

Female.—Dull black, clothed with a thin pale glittering pubescence, which is more obvious on the face and pleura; most of mandibles and the palpi, yellowish-white; antennæ two-thirds the length of the body, entirely black; tegulæ pale yellowish; metathorax with the elevated lines well defined, the central area rather large and subquadrate. Wings hyaline, iridescent; nervures and stigma fuscous, pale at base; areolet small, subtriangular, petiolated. Legs dull rufous, the trochanters yellowish, the tibiæ and tarsi more or less obfuscated; the posterior coxæ, their trochanters above, and the base of their femora within, black. Abdomen rather short and stout, slender at base and becoming gradually broader and subcompressed towards the tip; black, somewhat shining, the apical margins of all the segments indistinctly dull rufous; ventral segments stained with yellowish; ovipositor exserted about one line. Length 2½—3 lines; expanse of wings 4—4½ lines.

Hab.—Illinois. Dr. Samuel Lewis.

Resembles *M. tibiator* in size and form, but the hind tibiæ are rufous and the abdominal segments are obscurely tipped with rufous.

6. **Mesoleptus obliteratus**, n. sp.

Black; mouth, tegulæ, four anterior coxæ and trochanters and the venter, yellowish; legs pale fulvous; wings hyaline, iridescent, areolet wanting.

Female.—Black, slightly pubescent; most of mandibles and palpi yellowish; antennæ nearly as long as the body, black, basal joint beneath and the tegulæ yellowish; metathorax with the elevated lines obsolete. Wings hyaline, iridescent; nervures and stigma fuscous, pale at base; areolet wanting. Legs pale fulvous, the four anterior coxæ and all the trochanters, yellowish; the posterior coxæ, tips of their tibiæ and most of their tarsi, black or blackish. Abdomen subfusiform, black, rather slender at base, broad and subcompressed at tip; first segment rather broadly dilated at tip, slender at base; ventral segments yellowish; ovipositor exserted about one line. Length 2½ lines; expanse of wings 4 lines.

Hab.—Illinois. Dr. Samuel Lewis.

7. **Mesoleptus compressus**, n. sp.

Black; mouth and tegulæ yellowish; legs mostly yellowish-red; wings hyaline, iridescent; areolet small, oblique, subpetiolated; abdomen much compressed.

Male.—Black, slightly pubescent; most of the mandibles and the palpi, yellowish; antennæ more than half the length of the body, entirely black; tegulæ yellowish; metathorax with the elevated lines rather indistinct, the central area small and subquadrate. Wings hyaline, beautifully iridescent; nervures and stigma pale ferruginous, the former pale yellowish at base; areolet small, very oblique and subpetiolated. Legs pale yellowish-red, the anterior pair in front, the trochanters, and the base of the posterior tarsi, pale yellowish; posterior coxæ and trochanters above more or less blackish, their tarsi obfuscated. Abdomen slender at base, very broad and much compressed at tip; entirely black, except a very obscure rufous stain on each side of the third segment; basal segment slightly dilated at tip; beneath, black. Length 2½ lines; expanse of wings 4 lines.

Hab.—Pennsylvania. E. T. Cresson.

SECTION 2.

8. **Mesoleptus obscurus.** n. sp.

Black; mouth and tegulæ yellowish; wings hyaline, areolet minute, petiolated: legs rufous, the trochanters yellowish; abdomen with the tip and sides of the 3rd and 4th segments obscure rufous.

Female.—Black, slightly pubescent, most of mandibles and the palpi, pale yellowish; antennæ two-thirds the length of the body, black, the basal joint beneath dull yellowish; tegulæ pale yellowish; metathorax with the elevated lines tolerably distinct, the central area rather large and subquadrate. Wings hyaline, iridescent, nervures fuscous, pale testaceous at base, costa and stigma pale testaceous, areolet minute, petiolated. Legs rufous, coxæ black, the two anterior pairs rufous beneath, their trochanters yellowish, the posterior tibiæ and tarsi slightly obfuscated. Abdomen elongate, slender at base, rather broad and subcompressed at tip; first segment slightly dilated towards the tip where it narrows again to the base of the 2nd segment; apical margins and sides of 3rd and 4th segments obscurely rufous; ventral segments yellowish; ovipositor exserted about one line. Length 3½ lines; expanse of wings 5½ lines.

Hab.—Illinois. Dr. Samuel Lewis.

9. **Mesoleptus argentifrons**, n. sp.

Black; face densely clothed with silvery pubescence; mandibles, palpi, 4 anterior coxæ and trochanters, pale yellowish; legs and a band on the 2nd and following abdominal segments rufous; wings hyaline, areolet minute, subtriangular, petiolated.

Male.—Black, clothed with a thin silvery pubescence, very dense on the face; mandibles and palpi pale yellowish; antennæ as long as the body, black, the basal joint piceous; tegulæ yellow; the elevated lines of the metathorax tolerably well defined, the central area rather large, subtriangular. Wings hyaline, nervures and stigma black, areolet minute, subtriangular, petiolated. Legs pale rufous, the four anterior pair tinged with yellowish; the four anterior coxæ and trochanters beneath, yellowish; posterior coxæ, their trochanters at base and all the tarsi more or less blackish, the posterior tibiæ sometimes tinged with yellow. Abdomen long, slender, subcylindric, rufous; the first, the second except its apical margin, and a large spot on the disk of all the following segments, black, sometimes the apical segments are obfuscated and the black spots indistinctly defined; apex not compressed; beneath pale rufous. Length 2½—3 lines; expanse of wings 3½—4 lines.

Hab.—Illinois. Dr. Samuel Lewis.

10. **Mesoleptus conjunctus**, n. sp.

Black; mouth, tegulæ and venter, pale yellowish; legs pale fulvous, posterior tibiæ with a faint whitish annulus; wings hyaline, areolet triangular, petiolated; apex of the 2nd and 3rd, and sides of the two following abdominal segments, rufous.

♂ ♀.—Black; most of mandibles and the palpi, yellowish; antennæ two-thirds the length of the body in the ♀, and as long as the body in the ♂, entirely black; tegulæ yellowish; metathorax with the elevated lines not well defined, the central area moderate, subquadrate. Wings hyaline, iridescent; nervures and stigma pale fuscous, paler at base; areolet triangular, petiolated. Legs pale fulvous, the four anterior coxæ black, their tibiæ blackish, with a broad obscure, whitish annulus in the middle, their tarsi obfuscated. Abdomen subfusiform, black, slender at base, broad and compressed at tip; basal segment slightly dilated at tip; apical margins of the 2nd and 3rd, and the sides of the two following segments, rufous; ventral segments yellowish, spotted with black towards the apex; ovipositor of the ♀ exserted about one line. Length 2½ lines; expanse of wings 4 lines.

Hab.—Illinois. Dr. Samuel Lewis.

Allied to *M. argentifrons*, but easily distinguished by the much larger areolet of the wings, and the different coloration of the legs and abdomen.

11. **Mesoleptus Oxylus**, n. sp.

Black; spot on mandibles, palpi, tegulæ and base of four anterior legs, yellow; wings hyaline, areolet small, triangular, petiolated; legs and middle of the abdomen, rufous.

Female.—Black; face and thorax with a slight silvery pubescence; a spot on each mandible and the palpi, pale yellowish; antennæ three-fourths the length of the body, black, the base beneath piceous. Thorax black, the tegulæ pale yellowish, the elevated lines on the metathorax well defined, the central area elongate, moderate, five or six-sided. Wings hyaline, iridescent; nervures pale fuscous, stigma and costa pale testaceous; areolet small, triangular, petiolated. Legs pale rufous, the four anterior trochanters beneath yellowish, the posterior tarsi obfuscated, pale at base. Abdomen black, the apical half of the 2nd, the 3rd except its base and the 4th segment entirely, rufous, sometimes the base of the 5th segment is also rufous; apex rather broad and compressed; beneath, more or less tinged with yellowish; ovipositor exserted about half a line. Length 2½–3 lines; expanse of wings 4–4½ lines.

Male.—Resembles the female, except that the antennæ are longer, with its basal joint sometimes entirely dull rufous, and the apex of the abdomen subcylindric, scarcely compressed. Length 3 lines.

Hab.—Delaware (Dr. T. B. Wilson); Illinois (Dr. Samuel Lewis).

This seems to be the most common species.

12. **Mesoleptus affinis**, n. sp.

Black; spot on mandibles, palpi, tegulæ and base of four anterior legs, yellow; wings hyaline, areolet minute oblique, petiolated; legs and the apical two-thirds of abdomen, rufous.

Male.—Black, the head and thorax with a slight silvery pubescence; a spot on each mandible, and the palpi, pale yellowish; antennæ as long as the body, black, the basal joint dull rufous. Thorax black, the tegulæ pale yellowish, metathorax with the elevated lines indistinct, the central area very elongate, not well defined. Wings hyaline, iridescent; nervures and stigma black; areolet minute, oblique, peliolated. Legs pale rufous, the anterior coxæ and all the trochanters, yellowish, the posterior tarsi obfuscated, pale at base. Abdomen obscure rufous, the first segment except extreme tip, basal half of the second, and extreme base of the third, black; middle of the apical segments obfuscated; apex broad, compressed, appendages blackish. Length 2¾ lines; expanse of wings 4¼ lines.

Hab.—Illinois. Dr. Samuel Lewis.

Very closely allied to *M. Oxylus*, but differs by the minute oblique areolet of the wings, by the anterior coxæ and all the trochanters being yellow, and by the apical segments of the abdomen being broadly compressed and entirely rufous.

13. **Mesoleptus flavirictus**, n. sp.

Black; face silvery; mandibles, palpi, basal joint of antennæ beneath, tegulæ and the legs at base, yellow; rest of legs and the abdomen except base and apex, rufous; wings hyaline, areolet small, oblique.

Female.—Black, thinly clothed with silvery pubescence, more obvious on the face; mandibles except tips, and the palpi, pale yellow; antennæ two-thirds the length of the body, blackish at base, dull rufous towards the tip, basal joint beneath yellow; tegulæ pale yellowish; elevated lines on metathorax not well defined, the central area rather large, elongate. Wings hyaline, iridescent; nervures and stigma pale fuscous, the former yellowish at base; areolet small, subtriangular, oblique, petiolated. Legs pale rufous, the four anterior coxæ, all the trochanters, extreme base of the tibiæ and most of the tarsi, yellowish; posterior tibiæ and tarsi obfuscated at tips. Abdomen elongate, subcompressed, broad at tip, rufous; the first, most of the 2nd, extreme base of the 3rd and the two or three apical segments, black; beneath tinged with yellowish; ovipositor subexserted. Length 3½ lines; expanse of wings 5 lines.

Hab.—Pennsylvania. E. T. Cresson.

Closely allied to *M. Oxylus* and *M. affinis*, but is larger and easily distinguished by the basal joint of the antennæ being yellow beneath.

14. **Mesoleptus subrubidus**, n. sp.

Black; spot on mandibles, palpi, tegulæ and trochanters, pale yellowish; wings hyaline, areolet triangular, petiolated; legs and abdomen except base, rufous.

Male.—Black, clothed with a thin, pale, glittering pubescence; spot on each mandible and the palpi, pale yellowish; antennæ porrect, as long as the body, entirely black; tegulæ pale yellowish; metathorax with the elevated lines tolerably distinct, the central area large, subquadrate. Wings very faintly tinged with fuscous, iridescent; nervures and stigma fuscous, the former yellowish at base; areolet small, triangular, petiolated. Legs rufous; the four anterior coxæ and all the trochanters beneath, pale yellowish: posterior coxæ, except tips, black. Abdomen long, slender at base and gradually thickened towards the tip which is subcylindric, shining, rufous, the first, second except tip and the extreme base of the third segments, black; apex sometimes slightly obfuscated. Length 3½ lines; expanse of wings 5 lines.

Hab.—New Jersey (Cresson); Illinois (Dr. Lewis).

Resembles *M. Oxylus* in coloring, but is much larger, more elongate and slenderer.

15. **Mesoleptus? dimidiatus**, n. sp.

Black; mouth and tegulæ yellowish; legs and middle of abdomen pale rufous; venter yellowish; wings hyaline, areolet minute, oblique, petiolated; ovipositor long.

Female.—Black, shining, slightly pubescent; most of mandibles and the palpi, yellowish; antennæ two-thirds the length of the body, black, the basal joint beneath dull yellow; tegulæ pale-yellowish; metathorax slightly sulcate behind and somewhat transversely aciculate, the elevated lines well deffined, the central area rather large, pentangular, the lower portion open. Wings hyaline, slightly iridescent, nervures and stigma blackish, pale at base; areolet minute, oblique and petiolated. Legs pale rufous, the tarsi paler, obfuscated at tip, the posterior coxæ black. Abdomen robust, subfusiform, slender at base, broad and subcompressed at the apex; first segment dilated at tip, the peduncle slender; apex of the 1st, the whole of the 2nd and the base of the 3rd segments, pale rufous; remaining segments black; ventral segments yellowish; ovipositor as long as the abdomen, rufo-piceous. Length 3¼ lines; expanse of wings 5½ lines.

Hab.—Illinois. Dr. Samuel Lewis.

This may not belong to *Mesoleptus* on account of its long ovipositor; otherwise it has the characters of that genus.

16. **Mesoleptus decoloratus**, n. sp.

Black; face, legs and middle of abdomen obscure yellowish-red; wings hyaline, areolet triangular; abdomen clavate.

Male.—Black, slightly pubescent; face beneath the antennæ, clypeus and mouth, obscure testaceous; antennæ very slender, longer than the body, rufo-fuscous, pale at base; tegulæ and a minute spot before the wings, pale yellowish; metathorax with the elevated lines tolerably distinct, the central area elongate. Wings ample, hyaline, iridescent; nervures and stigma fuscous, pale yellowish at base; areolet triangular. Legs pale rufous, the tarsi paler. Abdomen slightly petiolated, clavate, dull yellowish-red, the basal segment, except tip, and the two or three apical segments black, the second segment sometimes obfuscated on its basal half. Length 3¾ lines; expanse of wings 6 lines.

Hab.—Illinois. Dr. Samuel Lewis.

Resembles *M? dimidiatus* much in coloration, but the antennæ and wings are half again as long, and the abdomen differently shaped.

17. **Mesoleptus distinctus**, n. sp.

Black; spot on mandibles, palpi, inner side of antennæ at base and tegulæ, yellow; wings hyaline, iridescent, areolet triangular, petiolated; legs and most of abdomen, pale rufous.

Female.—Black; spot on mandibles and the palpi, pale yellowish; eyes large, prominent, approximate beneath the antennæ; antennæ porrect, nearly as long as the body, black, the 3rd to 6th or 8th joints yellowish on the inside. Thorax thinly clothed with a short, fine, pale, glittering pubescence; tegulæ pale yellowish; metathorax with the elevated lines well defined. Wings very faintly tinged with fuscous, beautifully iridescent; nervures and stigma fuscous; areolet small, triangular, petiolated. Legs pale rufous, all the trochanters beneath pale yellowish, the posterior tibiæ slightly obfuscated, the posterior coxæ mostly black. Abdomen rather slender, broad and subcompressed at tip, rufous, the first, second except tip and the base of the third segments, black, the fifth and sixth segments sometimes obfuscated; ovipositor exserted about one line. Length 3 lines; expanse of wings 4½ lines.

Hab.—New Jersey. E. T. Cresson.

Easily distinguished from all other species known to me, by the basal joints of the antennæ being yellowish on the inside.

18. **Mesoleptus porrectus**, n. sp.

Black; most of mandibles, palpi and tegulæ, yellowish; legs and abdomen, pale rufous; wings hyaline, areolet minute, oblique, petiolated; ovipositor nearly as long as the abdomen.

Female.—Black; most of the mandibles and the palpi, yellowish; antennæ three-fourths the length of the body, black above, somewhat piceous beneath; tegulæ yellowish; metathorax with the elevated lines tolerably distinct, the central area narrow and very elongate. Wings hyaline, iridescent; nervures and stigma fuscous, the former yellowish at base; areolet minute, oblique, petiolated. Legs, including the coxæ, entirely yellowish-rufous. Abdomen slender at base, very broad and much compressed at tip, which is abruptly truncate, the ovipositor, which is more than half the length of the abdomen, is porrect; extreme base of the first segment and the middle of the three apical segments, blackish, the remainder yellowish-rufous. Length 3 lines; expanse of wings 4½ lines.

Hab.—Delaware. Dr. Thos. B. Wilson.

19. **Mesoleptus subtenuis**, n. sp.

Black; most of mandibles, palpi, basal joint of antennæ beneath, tegulæ, legs, and middle of abdomen, yellow or reddish-yellow; wings hyaline, areolet minute, oblique, petiolated.

Male.—Slender, black; most of the mandibles and the palpi, yellowish; antennæ as long or a little longer than the body, black, the basal joint beneath with a yellow spot; tegulæ yellowish; the elevated lines on the metathorax rather indistinct. Wings very faintly tinged with fuscous, iridescent; nervures and stigma fuscous, the former yellowish at base; areolet minute, oblique, petiolated. Legs, including the coxæ, entirely reddish-yellow; the posterior tibiæ and tarsi sometimes slightly obfuscated. Abdomen elongate, rather slender, rather broad and subcompressed at tip, black; apex of the first, whole of the second and the basal half of the third and fourth segments, reddish-yellow. Length 2¼ lines; expanse of wings 4 lines.

Hab.—Illinois. Dr. Samuel Lewis.

20. **Mesoleptus nigripes**, n. sp.

Black; spot on mandibles yellowish; wings subhyaline, areolet small, triangular, petiolated; apical half of the fourth and all the following segments dull rufous.

Female.—Black, rather short, clothed with a thin whitish pubescence; each mandible with an obscure yellowish spot; antennæ rather more than half the length of the body, entirely black; metathorax with the elevated lines well defined, the central area pentangular, moderate. Wings slightly stained with fuliginous; nervures and stigma black; areolet small, triangular, petiolated. Legs black, the anterior pair rufo-piceous in front. Abdomen rather stout, the first segment and basal half of the second, black, the remainder rufous; apex broadly compressed; beneath stained with yellowish; ovipositor rufous, exserted about one line. Length 3½ lines; expanse of wings 5½ lines.

Hab.—Illinois. Dr. Samuel Lewis.

21. **Mesoleptus hostilis**, n. sp.

Black; mandibles mostly yellowish; most of abdomen and legs obscure rufous; wings hyaline, areolet minute, subtriangular, petiolated.

Male.—Black, rather slender, clothed with a thin whitish pubescence; each mandible with a large yellowish spot; antennæ as long as the body, entirely black; metathorax with the elevated lines indistinct, the central area moderate, elongate. Wings hyaline, with a faint tinge of fuliginous, iridescent; nervures and stigma black; areolet subtriangular, minute, petiolated. Legs rufo-piceous, the anterior pair paler; coxæ, trochanters and most of the four posterior femora, black; posterior tarsi blackish. Abdomen long, slender, subcylindric, shining, dull rufous, except the basal segment; apex not compressed; sometimes the two apical segments are obfuscated. Length 3½ lines; expanse of wings 5 lines.

Hab.—Illinois. Dr. Samuel Lewis.

This may be the male of *M. nigripes.*

22. Mesoleptus vicinus, n. sp.

Black; mandibles, palpi and tegulæ, pale yellowish; legs and abdomen except base, rufous; wings hyaline, areolet triangular, petiolated.

Female.—Black, thinly clothed with a pale glittering pubescence; most of mandibles and the palpi, yellowish; antennæ three-fourths the length of the body, black; tegulæ yellowish; metathorax with the elevated lines well defined, the central area subquadrate. Wings almost hyaline, iridescent; nervures and stigma testaceous, the former much paler at base; areolet small, subtriangular, petiolated. Legs rufous, the trochanters yellowish, the posterior coxæ piceous. Abdomen elongate, slender at base, gradually thickened and subcompressed towards the apex; rufous, the first and second segments except their tips, black; beneath, slightly tinged with yellowish; ovipositor rufous, exserted about one line. Length 3½ lines; expanse of wings 5 lines.

Hab.—New Jersey. E. T. Cresson.

Resembles *M. hostilis*, but is more robust, and the legs are almost entirely rufous.

23. Mesoleptus vultus, n. sp.

Black; face, palpi, basal joint of antennæ beneath, tegulæ and four anterior coxæ and trochanters, pale yellowish; legs and apex of the four basal segments of the abdomen, pale rufous; wings hyaline, areolet 5-angular.

Male.—Black, shining; face, clypeus, mandibles and palpi, pale yellowish; antennæ porrect, about as long as the body, piceous, the basal joint beneath, pale yellowish, the apical joints beneath tinged with rufous. Thorax polished; tegulæ and a spot before the fore-wings, pale yellowish; the elevated lines on the metathorax tolerably well defined, the central area moderate, subrotundate. Wings hyaline, iridescent; nervures and stigma fuscous, the former pale at base; areolet 5-angular.

Legs yellowish-rufous, the four anterior coxæ and trochanters pale yellowish, the posterior tibiæ and tarsi obfuscated. Abdomen long and slender, black, shining at tip; apical margins of the 1st, 2nd and 4th segments and the apical half of the 3rd segment, pale rufous, that on the 4th segment obscure. Length 3 lines; expanse of wings 4 lines.

Hab.—Delaware. Dr. Thos. B. Wilson.

24. **Mesoleptus flavifrons**, n. sp.

Black; face, mouth, spot on each side of mesothorax, tegulæ and four anterior coxæ, yellow; legs and abdomen, except base, honey-yellow; wings large, hyaline, areolet subtriangular, oblique; subpetiolated; abdomen clavate.

Male.—Head black, shining; the face beneath the antennæ, clypeus, mandibles and palpi, yellow; antennæ very slender, longer than the body, brown-black, paler towards the tips, the two basal joints beneath yellowish. Thorax black, shining; a spot on each side of the mesothorax anteriorly, tegulæ, and small spot before and another beneath the fore-wings, yellow; scutellum convex, black; metathorax black, shining, almost smooth, without elevated lines, except a few longitudinal rugæ on the disk. Wings long and ample, hyaline, beautifully iridescent; nervures fuscous, pale testaceous at base, stigma black, with an obscure pale spot at base; areolet subtriangular, slightly oblique and subpetiolated, the 2nd recurrent nervure somewhat angular in the middle. Legs honey-yellow, the four anterior coxæ and all the trochanters, pale yellowish; tips of the posterior tibiæ black. Abdomen clavate, slender at base; 1st segment sublinear, slender, slightly dilated at tip, with a rather prominent tubercle on each side of the middle; the segments gradually dilated from the 2nd segment to the tip; basal segment black, its tip and all the remaining segments honey-yellow; beneath paler. Length 3½ lines; expanse of wings 6½ lines.

Hab.—New Jersey. E. T. Cresson.

25. **Mesoleptus bicolor**, n. sp.

Black; mouth, antennæ, legs and abdomen dull honey-yellow; wings hyaline, areolet oblique, subpetiolated; abdomen slightly petiolated, subclavate.

Male.—Head black, anterior margin of the clypeus and most of mandibles rufo-testaceous; palpi whitish; antennæ very slender, longer than the body, dull honey-yellow. Thorax black; tegulæ whitish; scutellum and metathorax black, the elevated lines of the latter subobsolete. Wings ample, hyaline, iridescent; nervures fuscous, pale testaceous at base; stigma rather large, fuscous, pale at base and tip; areolet small, oblique and subpetiolated. Legs slender, yellowish; the posterior pair honey-yellow; the anterior and middle coxæ yellowish-white; tips of tarsi blackish. Abdomen slightly petiolated, subclavate, dull honey-yellow, apex obfuscated; basal segment gradually dilated towards the tip, the sides somewhat carinated, without tubercles. Length 4 lines; expanse of wings 7 lines.

Hab.—Pennsylvania. Mr. C. A. Blake.

Same form as *M. longicornis*, but differs by the head and thorax being black.

SECTION 3.

26. **Mesoleptus longicornis**, n. sp.

Dull yellowish-red; head and pleura beneath, black; face and tarsi yellowish; wings hyaline, areolet triangular, oblique, subpetiolated; abdomen subpetiolated.

Male.—Head transverse, black; the face beneath the antennæ, clypeus, mandibles and palpi, yellow; antennæ slender, longer than the body, orange-yellow, slightly involute at tips which are blackish. Thorax dull rufous, the dorsal lines tolerably well impressed; pleura beneath and slightly on the sides, black; tegulæ yellowish, scutellum and metathorax dull yellowish-rufous, the extreme sides of the latter with a large black spot. Wings large, hyaline, somewhat iridescent; nervures fuscous, pale at base, stigma testaceous; areolet small, obliquely triangular, subpetiolated. Legs pale honey-yellow, the posterior femora obfuscated, their tibiæ at tip blackish; all the tarsi yellowish-white, the claws blackish. Abdomen elongate, subclavate, subpetiolated, entirely honey-yellow, slightly dusky at the apex; basal segment sublinear, slightly and gradually dilated towards the tip, without lateral tubercles; ventral segments stained with yellowish. Length 5 lines; expanse of wings 11 lines.

Hab.—Delaware. Dr. Thos. B. Wilson.

27. **Mesoleptus concolor**, n. sp.

Dull honey-yellow; wings hyaline, areolet subtriangular; abdomen clavate.

Female.—Entirely dull honey-yellow, slightly tinged with brownish, shining, clothed with a thin pale, subsericeous pubescence; antennæ very slender, rather longer than the body; tegulæ pale yellowish; metathorax polished, the elevated lines distinct, the central area elongate, with a large, quadrate area on each side. Wings ample, hyaline, glossy, iridescent; nervures and stigma blackish, pale at base; areolet subtriangular, very slightly peliolated. Legs color of the body, tolerably slender. Abdomen, slender at base and gradually dilated towards the apex, polished; basal segment dilated at tip, the sides carinated without tubercles, and the disk slightly canaliculate; apical segments thickened and sometimes subcompressed. Length 3½—4 lines; expanse of wings 6—7 lines.

Hab.—New Jersey. E. T. Cresson.

28. **Mesoleptus unicolor**, n. sp.

Yellowish-testaceous; wings hyaline, areolet subtriangular, oblique; abdomen slightly petiolated, clavate.

Entirely dull yellowish-testaceous or pale honey-yellow, the face, tegulæ, pleura and tarsi much paler; antennæ very slender and longer than the body; mesothorax more or less obfuscated on the disk; metathorax with the elevated lines not well defined, the central area narrow and very elongate. Wings ample, hyaline, glossy and beautifully iridescent; nervures fuscous, pale at base, stigma large, fuscous, pale at base; areolet subtriangular, rather oblique, and slightly petiolated, the outer nervure rounded, the 2nd recurrent nervure straight. Legs rather slender, color of the body, the tarsi paler and blackish at tip. Abdomen clavate, slightly petiolated, slender at base and thickened towards the apex, polished; basal segment gradually dilated towards the tip, the sides carinated and without tubercles; apical segments rather broad, subcompressed, and somewhat obfuscated. Length 3 lines; expanse of wings 6 lines.

Hab.—Pennsylvania; Delaware. Dr. Thos. B. Wilson.

Smaller than *M. concolor* and somewhat paler in color, otherwise they are much alike.

29. **Mesoleptus discolor**, n. sp.

Pale testaceous; the vertex, antennæ, mesothorax, scutellum, metathorax, sides of pleura, and basal segment of abdomen, blackish; wings hyaline, areolet subtriangular, oblique.

Male.—Pale testaceous, shining; a large spot encircling the ocelli, and the occiput, blackish; antennæ very slender, longer than the body, blackish, pale testaceous at base. Thorax: mesothorax blackish, with two subobsolete, pale, longitudinal lines on the disk; tegulæ and pleura pale testaceous, the latter with a large blackish patch on each side; scutellum dull testaceous; metathorax blackish on the disk, and pale on the sides. Wings ample, hyaline, glossy and iridescent; nervures fuscous, pale at base; stigma large, blackish, pale at base; areolet subtriangular, oblique, subpetiolated, 2nd recurrent nervure slightly bent. Legs slender, color of the body, the coxæ paler. Abdomen slightly petiolated, clavate, polished, pale testaceous, the first segment blackish, gradually dilated towards the apex, without lateral tubercles; apical segments faintly obfuscated. Length 3 lines; expanse of wings 6 lines.

Hab.—Delaware. Dr. Thos. B. Wilson.

This may possibly be a variety of *M. unicolor*, which it resembles much in size and form, but the coloration is quite different.

30. **Mesoleptus antennatus**, n. sp.

Pale ferruginous; head and antennæ black, the latter with a broad white annulus; palpi, four anterior coxæ and all the tarsi, pale; wings hyaline, areolet triangular, scarcely petiolated.

Male.—Pale ferruginous, shining; head black, pubescent, mouth rufo-piceous, palpi pale; antennæ as long as the body, black, the basal joint beneath pale ferruginous, beyond the middle a broad white annulus. Thorax: mesothorax varied with fuscous, the pleura tinged with yellowish; lines of the metathorax rather indistinct, the central area very elongate. Wings hyaline, beautifully iridescent; nervures and stigma dark fuscous, the former testaceous at base; areolet triangular, scarcely petiolated. Legs pale ferruginous, the four anterior coxæ and legs in front and the posterior tarsi except tips, pale; posterior tibiæ obfuscated. Abdomen long, slender, polished, the extreme base and apex more or less obfuscated. Length 3½ lines; expanse of wings 5 lines.

Hab.—Delaware. Dr. Thos. B. Wilson.

Readily distinguished by the broad whitish annulus on the antennæ and the general coloration.

Genus **TRYPHON**, Grav.

SECT. 1.—Scutellum and abdomen black	Sp. 1— 3
" 2.—Scutellum pale; abdomen black, the margins of the segments pale	Sp. 4— 5
" 3.—Scutellum pale; abdomen yellow and black	Sp. 6
" 4.—Scutellum black; abdomen red, or red and black, or black and yellow	Sp. 7—16

SECTION 1.

1. **Tryphon pedalis**, n. sp.

Black, shining; legs pale fulvous, posterior tibiæ and tarsi black, annulated with white; wings hyaline, iridescent, areolet small, oblique, subpetiolated; abdomen sessile.

Male.—Black, shining, slightly pubescent; most of the mandibles and the palpi, whitish; antennæ as long as the body, piceous, the basal joint black. Thorax polished, the dorsal lines well impressed, deeply so in front; tegulæ whitish; metathorax with the elevated lines tolerably well defined, the central area moderate, subquadrate. Wings hyaline, iridescent; nervures and stigma blackish, pale at base; areolet small, oblique, subpetiolated. Legs pale fulvous, the posterior tibiæ black, with a broad white annulus in the middle; their tarsi also black, annulated with white. Abdomen black, shining, sessile; basal segment with two sharply defined longitudinal carinæ on the disk; apical segment somewhat pointed. Length 2¾ lines; expanse of wings 5 lines.

Hab.—Illinois. Dr. Samuel Lewis.

2. **Tryphon carinatus**, n. sp.

Black; face and legs yellow or yellowish-red; wings obscure hyaline, areolet wanting; legs short and thick, abdomen sessile, subclavate, basal segments carinated.

Male.—Black, rather shining, thickly clothed with pale pubescence; face, except a short elongate blackish mark just beneath the antennæ, clypeus, except a blackish spot on each lateral margin, tips of the mandibles and the palpi, yellowish; antennæ about as long as the body, black; tegulæ obscurely yellowish; scutellum flat, rather large, its sides carinated; metathorax with the elevated lines longitudinal and sharply defined, the central area narrow and extending the whole length of the metathorax. Wings obscure hyaline, iridescent; nervures and stigma black, the former pale at base; areolet wanting. Legs short and thick as in *Exochus;* pale rufous, the two anterior pairs more or less tinged with yellowish, the posterior coxæ mostly black, and their tarsi brownish. Abdomen sessile, subclavate; basal segment with four sharply defined longitudinal carinæ; the second segment longitudinally rugose, with a well defined carina down its middle; the three following segments rather densely and deeply punctured and clothed with pale, appressed pubescence, the punctures on the apical segments fine and indistinct. Length 3 lines; expanse of wings 4½ lines.

Hab.—Illinois. Dr. Samuel Lewis.

This little species has much the general appearance of an *Exochus*, but the face is flat and not protuberant. The metathorax and base of the abdomen are acutely carinated and the legs are short and thick.

3. **Tryphon? limatus**, n. sp.

Black, polished; mouth yellowish; antennæ brownish; legs fulvous, hind tibiæ white, their tips and the tarsi black; wings hyaline, areolet oblique, petiolated; abdomen subpetiolated.

Male.—Black, highly polished; face rather densely punctured, somewhat protuberant just beneath the antennæ; clypeus very transverse, much depressed at base, and almost entirely yellowish, as well as the mandibles and palpi; antennæ nearly as long as the body, brownish, the extreme base black; tegulæ whitish; metathorax convex, smooth and polished, without elevated lines. Wings ample, hyaline and iridescent; nervures and stigma blackish, whitish at base; areolet oblique, subtriangular, petiolated. Legs slender, rather long, fulvous, the four anterior tibiæ and tarsi paler; tips of the posterior femora, and tibiæ, and their tarsi except base, black; rest of the posterior tibiæ and base of their tarsi, white. Abdomen elongate, subpetiolated, slightly compressed at tip; first segment contracted near the base and gradually dilated to the tip; second segment at base with a well impressed fovea on each side. Length 4 lines; expanse of wings 8 lines.

Hab.—Delaware. Dr. Thos. B. Wilson.

SECTION 2.

4. **Tryphon? submarginatus**, n. sp.

Black; most of the face, mouth, sides of mesothorax, scutellum and apical margins of abdominal segments, white; pleura and legs in part pale rufous, posterior tibiæ and tarsi black, the former with a broad white annulus; wings hyaline, iridescent, areolet wanting: abdomen subsessile.

Male.—Black; two ill-defined lines on the face beneath the antennæ spreading on each side of the clypeus and continued beneath the eyes, the clypeus, mandibles except tips and the palpi, whitish; antennæ slender, rather longer than the body, rufo-piceous, the basal joint beneath pale. Thorax: mesothorax and pectus black; tegulæ, a broad sutural line before the wings, extending to the dorsal lines where it is suddenly truncate, dilated and pointed before and behind, a line beneath the fore-wings and a subobsolete spot beneath the hind-wings, whitish; pleura, except a space beneath the fore-wings, rufous; scutellum rather convex, whitish, the space on each side black; postscutellum black with a transverse whitish spot on the middle; metathorax rufous, stained with blackish on the disk, the elevated lines obsolete, the central area small, elongate and ill-defined. Wings long and ample, hyaline, iridescent; nervures and stigma black, pale at base; areolet wanting, the 2nd recurrent nervure somewhat angular in the middle. Legs slender, posterior pair long; pale rufous; the four anterior coxæ, the trochanters and most of the tarsi, whitish; posterior tibiæ whitish, its tip and extreme base, black, their tarsi entirely black. Abdomen subsessile, elongate-subovate, black, shining towards the tip; basal segment grooved down the middle; apical margins of all the segments narrowly whitish, rather indistinct on the first three segments; ventral segments white. Length 3½ lines; expanse of wings 7 lines.

Hab.—Illinois. Dr. Samuel Lewis.

5. **Tryphon pleuralis**, n. sp.

Black; mouth and tegulæ, yellowish-white; pleura, scutellum and legs, rufous; wings hyaline, areolet small, oblique, subpetiolated; abdomen with the apical margins of the dorsal segments pale; abdomen subpetiolated.

Female.—Black, subopaque, clothed with a very short, whitish pile; clypeus, mandibles, a spot on the cheeks beneath, and the palpi, whitish; antennæ slender, rather longer than the body, piceous, tinged with yellowish towards the base beneath; mesothorax and pectus black, pleura and scutellum dull rufous, as well as a spot behind the scutellum; tegulæ pale yellowish-white; metathorax entirely black, the elevated lines obsolete, the central area elongate, moderate. Wings hyaline, beautifully iridescent; nervures and stigma blackish, pale at base; areolet small, obliquely subtriangular and subpetiolated; the transverse cubital nervure within the submarginal cell very much arcuated towards the costa, the 2nd recurrent nervure straight, or slightly oblique. Legs slender, pale rufous; the four anterior coxæ, trochanters and tarsi, whitish; the posterior tibiæ and tarsi and the tips of the other tarsi blackish, extreme base of the posterior tibiæ whitish. Abdomen subpetiolated or slightly subsessile; black, shining towards the apex; extreme apical margins of the segments whitish, obsolete or subobsolete on the three basal segments, and distinct on the apical ones, the lateral margins of which are rather broadly marked with white; first segment longer than the second, much narrowed toward the base, and again slightly dilated before reaching the base, the lateral tubercles not prominent, situated a little before the middle, disk faintly canaliculate; beneath stained with whitish; ovipositor subexserted. Length 3 lines; expanse of wings 5 lines.

Hab.—New Jersey. E. T. Cresson.

SECTION 3.

6. **Tryphon? trifasciatus**, n. sp.

Black, polished; tegulæ, scutellum, postscutellum, part of metathorax, legs and three bands on abdomen, yellow; wings subhyaline, areolet wanting; legs short and thick; abdomen subpetiolated, clavate.

Male.—Black, polished, clothed with a rather thin pale pubescence; head entirely black, eyes prominent, face narrow, palpi pale; antennæ nearly as long as the body brownish above, yellowish beneath, the basal joint beneath yellow. Thorax: the pleura protuberant beneath the wings, with a deep cavity before and behind to receive the anterior and intermediate femora in repose; scutellum and postscutellum yellow; metathorax small, shining, pubescent, black with a large transverse yellowish spot across its middle, sometimes obsolete, immediately behind the postscutellum a well impressed point, and at the insertion of the abdomen several short elevated ridges. Wings subhyaline, faintly stained with fuscous; nervures and stigma fuscous, the former pale at base; areolet wanting, the 2nd recurrent nervure very much angular near its base. Legs short and thick as in *Exochus;* yellow, the posterior coxæ beneath and the apical half of their femora, black; sometimes the four anterior femora exteriorly, the tips of the posterior tibiæ and tips of all the tarsi, are blackish. Abdomen subpetiolated or slightly subsessile, clavate, polished, black, the apical half of the three basal segments yellow; basal segment somewhat canaliculate or carinated on the disk towards the base. Length 5 lines; expanse of wings 7½ lines.

Hab.—Pennsylvania. Mr. Chas. A. Blake.

SECTION 4.

7. **Tryphon americanus**, n. sp.

Black; face, palpi and four anterior legs, yellow; abdomen, except basal segment, rufous; wings hyaline, areolet triangular.

Male.—Head black, the face beneath the antennæ, clypeus, mandibles except tips, and the palpi, yellow; immediately beneath the antennæ a longitudinal, abbreviated, blackish line and on each lateral margin of the clypeus a blackish, well impressed puncture; antennæ two-thirds the length of the body, porrect, blackish, the base and apex yellowish, the basal joint beneath yellow. Thorax black, shining; tegulæ pale yellowish; metathorax shining, with four sharply defined longitudinal carinæ, the two middle ones approximate. Wings hyaline; nervures and stigma fuscous, pale at base; areolet small, triangular, slightly petiolated, the second recurrent nervure angular in the middle. Legs: the two anterior pairs, the posterior coxæ and trochanters, and the basal half of their tibiæ, and most of their tarsi beneath, yellow; the posterior femora rufous, their extreme tips, the apical half of their tibiæ and most of their tarsi above, black. Abdomen elongate, subsessile, rufous; basal segment except its apex, black, flattened, with two elevated lines, very slightly dilated at the apex; apical segment faintly tinged with yellowish. Length 5 lines; expanse of wings 8 lines.

Hab.—Delaware (Dr. Thos. B. Wilson); Canada West (Mr. B. Billings, Jr.)

8. **Tryphon affinis**, n. sp.

Black; mouth, legs and abdomen, rufous; wings hyaline, areolet subtriangular, petiolated; abdomen subsessile, subclavate.

Female.—Head black; clypeus, mandibles and palpi, dull yellowish; antennæ two-thirds the length of the body, blackish, yellowish at base and at tips. Thorax shining, black; tegulæ pale yellow; scutellum and metathorax black, the latter polished, with four very sharply defined longitudinal carinæ as in the preceding species. Wings obscure hyaline, faintly tinged with fuliginous at tips; nervures and stigma blackish, whitish at base; areolet minute, subtriangular, slightly oblique, petiolated; 2nd recurrent nervure angular in the middle. Legs pale rufous, the two anterior pairs and the posterior trochanters tinged with yellowish; posterior femora at tips, their tibiæ, except a broad, pale, ill-defined annulus near the base, and most of their tarsi, blackish. Abdomen subsessile, subclavate, shining, rufous, the first segment except tip, black, with two approximate, well-defined longitudinal carinæ on the middle towards the base; apical segments very slightly compressed. Length 4 lines; expanse of wings 6 lines.

Hab.—Pennsylvania and New Jersey. E. T. Cresson.

Closely allied to *T. americanus*, but is smaller, with the face entirely black.

9. **Tryphon seminiger**, n. sp.

Black; face silvery; mouth yellowish; legs and abdomen, except base, rufous; wings subhyaline, areolet oblique, petiolated; abdomen subsessile, subclavate.

Female.—Black, thinly clothed with very short whitish pubescence, more obvious and silvery on the face; clypeus, mandibles and palpi dull yellowish; antennæ two-thirds the length of the body, black above, brownish beneath; tegulæ dull yellowish; metathorax with the elevated lines irregular, tolerably well defined. Wings faintly tinged with fuliginous; nervures and stigma black, pale at base; areolet minute, oblique, petiolated; 2nd recurrent nervure angular in the middle. Legs obscure rufous, the four anterior tibiæ and tarsi tinged with yellowish; coxæ black; the posterior femora and tibiæ at tips and their tarsi, obfuscated. Abdomen subsessile, clavate, rufous; basal segment black, except the extreme tip, with two approximate carinæ on the middle towards the base. Length 3½—4 lines; expanse of wings 6—6½ lines.

Hab.—Illinois. Dr. Samuel Lewis.

Closely resembles the two preceding species in form and color, but is at once distinguished by the sculpture of the metathorax, which in this species is irregular and not sharply defined, while in the other two there are four very sharply defined and regular longitudinal carinæ.

10. **Tryphon semirufus**, n. sp.

Black; tegulæ yellow; legs and abdomen rufous; wings hyaline, areolet wanting; abdomen subsessile, subovate.

Female.—Black; clypeus polished, with large deep punctures; spot on mandibles at base and the palpi, yellowish; antennæ two-thirds the length of the body, brown-black, the basal joint beneath rufous; tegulæ pale yellowish; metathorax with the elevated lines irregular and ill-defined, the central area small and elongate, subobsolete. Wings hyaline, iridescent; nervures and stigma blackish, pale at base; areolet wanting; 2nd recurrent nervure straight. Legs, with the coxæ, rufous; apical half of the posterior femora blackish, their tarsi obfuscated. Abdomen rather short, subovate, subsessile, somewhat flattened above, the apex slightly compressed and tinged with blackish. Length 3 lines; expanse of wings 5 lines.

Hab.—Illinois. Dr. Samuel Lewis.

11. Tryphon analis, n. sp.

Black; face yellow; legs and abdomen, except apex, rufous; wings hyaline, areolet triangular, petiolated; abdomen sessile, flattened.

Male.—Head black; face beneath antennæ, clypeus, mandibles and palpi, yellowish; lateral margins of the clypeus and extreme tips of mandibles, black; face somewhat elevated with a deep, subtriangular incisure towards the base of the antennæ; antennæ three-fourths as long as the body, brown above, the two basal joints black, beneath reddish-brown, the basal joints paler. Thorax smooth and polished; tegulæ yellow; metathorax shining, the elevated lines irregular and tolerably well defined, the central area moderate and subquadrate. Wings hyaline, iridescent; nervures and stigma fuscous, pale at base; areolet small, triangular, petiolated; 2nd recurrent nervure angular in the middle. Legs, with the coxæ, pale rufous, the trochanters yellowish, the tips of the posterior femora, tibiæ and tarsi somewhat obfuscated. Abdomen sessile and flattened as in *Bassus*, the dorsal surface of the three basal segments being somewhat uneven, the first segment with two carinæ near its base; the four basal segments pale rufous, the apical margin of the fourth and the remaining segments black, polished. Length 3½ lines; expanse of wings 6 lines.

Hab.—Pennsylvania. E. T. Cresson.

This species has much the form of those of the genus *Bassus*.

12. Tryphon festivus, n. sp.

Black; mouth, antennæ and four anterior legs, yellowish; posterior legs and abdomen except base, rufous; wings long, hyaline, areolet oblique, petiolated; abdomen subsessile, subclavate.

Male.—Black, shining, clothed with a short, thin, whitish pubescence, which is most obvious and silvery on the face; clypeus, mandibles and palpi, yellowish; antennæ as long as the body, brownish above, yellowish beneath, the basal joint yellow beneath; tegulæ pale yellow; metathorax punctured, the elevated lines obsolete. Wings long, hyaline, iridescent; nervures and stigma blackish, pale at base; areolet small, oblique and petiolated; 2nd recurrent nervure with a rudimental nervure on its exterior middle. Legs: the two anterior pairs yellowish, slightly tinged with rufous; the posterior pair dull rufous, somewhat obfuscated; their coxæ black, with the tips beneath and the trochanters, yellowish. Abdomen subsessile, or slightly subpetiolated, subclavate; basal segment carinated on its disk, with slight indications of a tubercle on each side of the basal third, its color is black, except the tip which is rufous as well as all the remaining segments. Length 3½ lines; expanse of wings 6¼ lines.

Hub.—Illinois. Dr. Samuel Lewis.

13. **Tryphon tibialis**, n. sp.

Black; mouth, base of antennæ beneath, tegulæ and most of legs, yellowish; middle of abdomen pale rufous, wings hyaline, iridescent, areolet minute, oblique, petiolated; hind tibiæ and tarsi annulated with black and white; abdomen subpetiolated, clavate.

Male.—Black, polished, slightly pubescent; face clothed with silvery pubescence, the clypeus, mandibles except tips, and the palpi, yellowish; antennæ rather longer than the body, rather slender, brown-black, the two basal joints beneath yellow. Thorax polished, tegulæ yellowish; metathorax with the elevated lines not well defined, the central area moderate, quadrate. Wings hyaline, beautifully iridescent; nervures and stigma dark fuscous, pale at base; areolet minute, oblique and petiolated; 2nd recurrent nervure slightly bent inwards near the base. Legs pale fulvous, the four anterior coxæ, their tibiæ and tarsi and all the trochanters, pale yellowish; posterior tibiæ black with a broad whitish annulus on the middle, their tarsi black, the joints whitish at base. Abdomen subpetiolated, subclavate, polished, black, the apical third of the first, the second and third segments pale yellowish-rufous, on each side of the third segment a rounded blackish stain; basal segment slightly carinated on the disk, with a small, ill-defined tubercle on each side about the middle. Length 2¾ lines; expanse of wings 4½ lines.

Hab.—Illinois. Dr. Samuel Lewis.

14. **Tryphon rufocinctus**, n. sp.

Black; most of legs and the 2nd and 3rd segments of abdomen, dull rufous; wings hyaline, iridescent, areolet wanting; abdomen nearly sessile.

Female.—Black, subopaque; head and antennæ entirely black, the latter two-thirds the length of the body; tegulæ pale yellowish; metathorax with the elevated lines subobsolete, the central area small and elongate. Wings hyaline, beautifully iridescent; nervures and stigma black, pale at base; areolet wanting. Legs dull rufous or brownish, all the coxæ and the posterior femora black. Abdomen almost sessile, black, the 2nd and 3rd segments rufous; apical segments shining. Length 2½ lines; expanse of wings 4 lines.

Hab.—Illinois. Dr. Samuel Lewis.

15. **Tryphon minimus**, n. sp.

Black; middle of face, clypeus, mouth, tegulæ, broad sutural line before the wings, spot on each side of pleura behind and the coxæ and trochanters, yellow; legs and 3rd abdominal segment, fulvous; wings hyaline, areolet wanting; abdomen subsessile.

Female.—Black, polished; a large quadrate spot on the middle of the face, clypeus, large spot on the mandibles, and the palpi, yellow; eyes prominent; antennæ as long as the body, brown-black, the basal joint beneath tipped with yellowish. Thorax: tegulæ, a broad sutural line before the wings, extending to the dorsal lines where it is suddenly truncate, dilated and pointed before and behind, an irregular line beneath the fore-wings, a spot beneath the hind-wings and an elongate spot on each side of the pleura behind just before the middle coxæ, all yellowish; metathorax punctured, without elevated lines. Wings hyaline, iridescent; nervures and stigma fuscous, pale at base; areolet wanting; 2nd recurrent nervure straight. Legs fulvous; the posterior tibiæ at tips and their tarsi obfuscated; all the coxæ and trochanters bright yellow. Abdomen subsessile or very nearly sessile, with a stout tubercle on each side of the first segment near the base; middle of the two basal segments somewhat concave; the apical margin of the 2nd and the whole of the 3rd segments above, fulvous; apical segments polished. Length 1¾ lines; expanse of wings 3½ lines.

Hab.—Illinois. Dr. Samuel Lewis.

16. **Tryphon capitatus**, n. sp.

Black, polished; head, pectus, pleura, legs and 3rd abdominal segment, pale fulvous; wings hyaline, stigma large, areolet wanting; abdomen subsessile.

Male.—Head rather large; subquadrate, entirely pale fulvous, shining, face paler; eyes small, round and black; antennæ as long as the body, brown-black, the basal joint yellowish. Thorax polished; mesothorax black; tegulæ, collar, pectus and pleura pale fulvous; scutellum and metathorax black, the extreme sides of the latter pale fulvous. Wings ample, hyaline, beautifully iridescent; nervures fuscous, pale at base, stigma large, black; areolet wanting. Legs, with the coxæ, pale fulvous, the tips of the posterior tibiæ, brownish. Abdomen subsessile or slightly subpetiolated, subclavate, polished, black, the 3rd segment pale fulvous; basal segment with a prominent tubercle on each side of the middle. Length 2 lines; expanse of wings 4 lines.

Hab.—Pennsylvania. E. T. Cresson.

Genus **CTENISCUS**, Haliday.

1. **Cteniscus mediatus**, n. sp.

Black; face, orbits, tegulæ, a sutural line before the wings, coxæ and trochanters yellowish; rest of legs pale rufous; wings hyaline, iridescent, areolet oblique, petiolated; abdomen subsessile, with a yellowish spot at tip of each segment.

Male.—Black, polished; face, frontal orbits, cheeks beneath, clypeus, mandibles and palpi, pale yellow; antennæ as long as the body, black above, brown beneath, the basal joint beneath yellowish. Thorax: tegulæ, a broad sutural line before and a short line beneath the wings, and an oblique line on each side of the pectus, pale yellow; scutellum rather convex, black, its tip yellowish; metathorax with the elevated lines tolerably well defined, the central area elongate. Wings hyaline, beautifully iridescent; nervures and stigma fuscous, pale at base; areolet small, oblique and petiolated. Legs pale rufous, all the coxæ and trochanters pale yellow, the posterior tibiæ and tarsi obfuscated. Abdomen subsessile, polished, somewhat flattened, black, all the segments with an apical yellow spot on the disk above, the spots becoming more transverse towards the apex; the incisure between the 3rd and 4th segments tinged with fulvous; basal segment subopaque, slightly canaliculate; base of 2nd segment somewhat depressed and uneven. Length 2½ lines; expanse of wings 4 lines.

Hab.—Illinois. Dr. Samuel Lewis.

2. **Cteniscus dorsalis**, n. sp.

Yellowish-brown; face, orbits, tegulæ, a line before the wings, four anterior coxæ and trochanters, and a spot on the disk of each abdominal segment, yellow; wings hyaline, iridescent, areolet oblique; abdomen sessile.

Male.—Yellowish-brown, polished; the face beneath the antennæ, frontal orbits, lower half of the cheeks, clypeus, mandibles and palpi, pale yellow; antennæ about as long as the body, rufo-piceous, the basal joint beneath tinged with yellowish. Thorax: tegulæ, a broad sutural line before, and a short one beneath the fore-wings, pale yellow; scutellum somewhat produced, with a large pale spot; metathorax convex, polished, the elevated lines subobsolete. Wings hyaline, iridescent; nervures and stigma fuscous, pale at base; areolet oblique, the 2nd recurrent nervure rounded outwardly, and received by the areolet at its tip. Legs color of the body, the four anterior coxæ and trochanters pale yellowish. Abdomen sessile, robust, only slightly narrowed at base, yellowish-brown or obscurely honey-yellow, each segment having on its disk at tip a transverse yellowish spot, very small on the first segment and becoming larger towards the apex; first segment slightly broader at tip than at base, the lateral margins somewhat carinated and the tubercles scarcely defined; the second segment has on each side an oblique well-impressed line, diverging from the basal middle to the lateral margin. Length 2½—3 lines; expanse of wings 5—6 lines.

Hab.—Illinois. Dr. Samuel Lewis.

3. **Ctenisсus orbitalis**, n. sp.

Fulvous; head large, white, vertex and occiput black; scutellum whitish; wings hyaline, areolet oblique, petiolated; abdomen subsessile, subclavate.

Male.—Head large, nearly quadrate, black, the face, frontal orbits, cheeks, clypeus, mandibles except tips, and the palpi pure white; antennæ nearly as long as the body, basal half blackish, apical half yellowish, basal joint robust and piceous beneath. Thorax fulvous, polished, posterior margin of the mesothorax in front of scutellum, blackish; tegulæ, a sutural line before the wings and another down each side of the pectus, whitish; scutellum and postscutellum whitish, the spaces on each side blackish; metathorax entirely fulvous, the elevated lines well defined, the central area moderate and elongate. Wings hyaline, iridescent; nervures and stigma fuscous, pale at base; areolet small, oblique and petiolated. Legs fulvous, the four anterior coxæ and trochanters whitish. Abdomen subsessile, subclavate, polished, entirely fulvous, slightly dusky towards the tip. Length 3 lines; expanse of wings 6 lines.

Hab.—Pennsylvania. E. T. Cresson.

Readly distinguished by the large black and white head, the rest of the body being fulvous.

4. **Ctenisсus flavicoxæ**, n. sp.

Black; face, orbits, tegulæ and coxæ, yellow; legs and abdomen, except base, fulvous; wings hyaline; areolet oblique, petiolated; abdomen subsessile.

Female.—Head rather large, black, polished; face, except a dark stain on its middle, frontal orbits, narrowed on each side of antennæ, cheeks beneath, clypeus, mandibles and palpi, pale yellow; antennæ as long as the body, blackish, the apical third yellowish, the two basal joints beneath yellow. Thorax black, polished; the tegulæ, a short sutural line before, and a minute line beneath the fore-wings, yellow; scutellum black, its tip yellowish; metathorax black, shining, the elevated lines well defined, the central area moderate, subrotundate. Wings hyaline, iridescent; nervures fuscous, pale at base, stigma large, black with a pale spot at base; areolet minute, oblique and petiolated. Legs fulvous, all the coxæ and trochanters pale yellow, the posterior tibiæ brownish. Abdomen subsessile, rather short, broad and subdepressed, polished; basal segment black, remaining segments fulvous, except the sides of the 2nd, 3rd and 4th segments which are blackish. Length 2½ lines; expanse of wings 5 lines.

Hab.—Delaware. Dr. Thos. B. Wilson.

5. **Ctenīscus clavatus**, n. sp.

Black; face, tegulæ, tip of scutellum, most of legs and the abdomen except base, yellowish; wings subhyaline, iridescent, areolet triangular, petiolated; abdomen clavate.

Male.—Shining, slightly pubescent; head black, face beneath the antennæ, clypeus, mandibles and palpi, yellow; antennæ longer than the body, black, honey-yellow towards the base, especially beneath. Thorax black; tegulæ pale yellow; scutellum convex, black, with a yellowish spot at tip and another on postscutellum; metathorax with the elevated lines well defined, the central area moderate, quadrate. Wings slightly stained with fuscous, iridescent; nervures and stigma testaceous, pale at base; areolet small, triangular, petiolated. Legs pale fulvous, coxæ black, the two anterior pairs beneath, all the trochanters and the anterior tibiæ and tarsi, yellowish; posterior tibiæ and tarsi blackish, the former with a broad pale annulus on the middle. Abdomen elongate, clavate, slender at base, polished; basal segment sublinear, carinated above and with a prominent tubercle on each side at base; 2nd segment depressed at base with a slight carina on the middle; remaining segments convex and gradually dilated, the tip obtusely pointed; the 1st and base of the 2nd segments blackish, remaining segments honey-yellow, with the apical margins of the 3rd, 4th and 5th segments yellow, margined in front with black. Length 3¼ lines; expanse of wings 5½ lines.

Hab.—Delaware. Dr. Thos. B. Wilson.

Genus EXOCHUS, Grav.

Section 1.—Areolet small.

1. **Exochus apicalis**, n. sp.

Black, shining: face, orbits and tegulæ, yellowish; legs and apex of abdomen rufous.

Male.—Black, shining, thinly clothed with a very short, appressed, pale pubescence; face, mouth and orbits, yellowish, tinged with pale rufous; antennæ about half the length of the body, rufo-piceous. Thorax flattened above, shining; tegulæ yellowish; metathorax abruptly truncate behind, its posterior face concave, on the disk above two not well-defined, approximate, longitudinal carinæ forming a narrow, elongate central area. Wings hyaline; nervures and stigma black, the former pale at base; areolet minute, oblique and petiolated. Legs rufous, the coxæ black. Abdomen sessile, shining, cylindrical, very slightly narrowed at base; the two apical segments rufous. Length 3½ lines; expanse of wings 5 lines.

Hab.—Illinois. Dr. Samuel Lewis.

2. **Exochus fulvipes**, n. sp.

Black, polished; legs pale fulvous; wings hyaline, areolet oblique, *petiolated.*

Male.—Black, smooth and polished, slightly pubescent; palpi pale-yellowish; antennæ brown-black above, rufo-piceous beneath, tinged with yellow towards the base; tegulæ pale yellowish. Wings hyaline. slightly iridescent; nervures and stigma black, pale at base; areolet minute, oblique, and petiolated. Legs entirely pale fulvous. Abdomen subcylindric, slightly narrowed at base, the second and following segments equilateral. Length 2½—3 lines; expanse of wings 4—5 lines.

Female.—Resembles the male, but the abdomen is shorter and broader; the ovipositor is yellowish and slightly exserted.

Hab.—Pennsylvania. E. T. Cresson.

3. **Exochus pygmæus**, n. sp.

Black, polished; legs pale fulvous; wings hyaline, areolet triangular, *not petiolated.*

Male.—Differs from *E. fulvipes* only in the much smaller size, and in the areolet of the superior wings being triangular, much larger and not at all petiolated. Length 2 lines; expanse of wings 3½ lines.

Hab.—Illinois. Dr. Samuel Lewis.

Section 2.—Areolet wanting.

4. **Exochus lævis**, n. sp.

Black, polished, legs reddish-brown; wings hyaline.

♂ ♀.—Black, smooth and polished, thinly clothed with a short, appressed, pale pubescence; palpi piceous; antennæ blackish, three-fourths the length of the body, thickened at base; tegulæ pale testaceous; metathorax polished, truncate behind, the elevated lines distinct, the central area elongate. Wings hyaline; nervures and stigma black. Abdomen highly polished, slightly narrowed at base, the first segment canaliculate, the remaining segments equilateral and subcylindric; ovipositor of the female rufous, scarcely exserted. Length 3¼ lines; expanse of wings 5 lines.

Hab.—California ♀ (Dr. Horn); Illinois ♂ (Dr. Lewis).

I see none but sexual differences between the specimen from California and those from Illinois.

5. **Exochus pleuralis**, n. sp.

Black; face, orbits, tegulæ, pectus, pleura, most of the legs and a triangular spot on each side of the 2nd, 3rd and 4th abdominal segments, yellowish; wings hyaline.

Male.—Black, polished, slightly pubescent; the face, mouth, and the frontal orbits very broad above and beneath the eyes, yellow; antennæ three-fourths the length of the body, brown-black above, rufo-piceous beneath. Thorax: mesothorax black; tegulæ, pectus and pleura, yellowish, the latter slightly stained with pale rufous; scutellum black, pale at tip; metathorax black above, its extreme sides reddish-yellow, polished, the elevated lines tolerably well defined, the central area large and quadrate. Wings hyaline, the nervures and stigma blackish, the former pale at base. Legs pale yellowish, the posterior femora pale rufous, and the extreme tips of their tibiæ and tarsi blackish. Abdomen black, polished, subcylindric, slightly narrowed at base; the first segment with two longitudinal carinæ on the disk and one on each lateral margin; on each side of the 2nd, 3rd and 4th segments at tip a rather large, triangular, pale testaceous spot; beneath, stained with yellowish. Length 2½ lines; expanse of wings 4 lines.

Hab.—Illinois. Dr. Samuel Lewis.

6. **Exochus dorsalis**, n. sp.

Black; face, orbits, line before the wings, pleura and most of legs, yellowish: mesothorax rufous; wings hyaline.

Male.—Head black, the face, frontal orbits broad above and beneath the eyes, and the mouth, pale yellowish; antennæ two-thirds the length of the body, black above, tinged with piceous beneath. Thorax: mesothorax flat, feebly punctured, polished, dull rufous, blackish in front; pectus stained with blackish; the tegulæ and a sutural line before the wings, pale yellowish-white; pleura pale fulvous; scutellum flat, polished, dull rufous margined with whitish; postscutellum black with a transverse white spot on its middle just beneath the scutellum; metathorax smooth and polished, black, its extreme sides pale fulvous, the elevated lines indistinct, the central area large, elongate-subquadrate. Wings hyaline, iridescent; nervures and stigma black. Legs pale fulvous, the anterior coxæ beneath, all the femora at tips, and most of the tibiæ and tarsi, white; posterior tibiæ black at base and apex, as well as the apex of all the tarsi. Abdomen cylindrical, scarcely narrowed at base, black, highly polished, its extreme apex with a somewhat obscure whitish spot. Length 2½ lines; expanse of wings 4 lines.

Hab.—New Jersey. E. T. Cresson.

7. **Exochus pallipes**, n. sp.

Black; face, scutellum, pleura and legs, pale yellowish; wings hyaline.

Male.—Black, somewhat shining, thinly clothed with a fine, short, whitish pubescence; face and frontal orbits broad above and beneath the eyes, pale yellowish; antennæ two-thirds the length of the body, blackish above, rufo-piceous beneath. Thorax: mesothorax black; tegulæ, pectus and pleura, pale yellowish, the latter slightly stained with pale rufous; scutellum dull rufous, its tip pale yellowish, postscutellum with a yellowish transverse spot on its middle; metathorax black, its extreme sides yellowish-red, the elevated lines not well defined, the central area large, elongate, irregular. Wings hyaline; nervures and stigma black. Legs pale yellowish-white, the posterior femora slightly stained with pale fulvous; apex of their tibiæ and tips of the tarsi, blackish. Abdomen black, shining, slightly narrowed at base; beneath, stained with pale yellowish. Length 2½ lines; expanse of wings 4 lines.

Hab.—Illinois. Dr. Samuel Lewis.

Genus TROGUS, Grav.

Trogus flavipennis, n. sp.

Black; head, antennæ, legs, scutellum and base of abdomen, yellowish-ferruginous: rest of abdomen yellow; wings yellow, apical margins fuliginous.

Head yellowish-ferruginous, the frontal orbits tinged with yellowish;

on each side of the clypeus a black spot; antennæ two-thirds the length of the body, porrect, pale rufous, blackish toward the tips. Thorax black, densely and finely punctured; middle of mesothorax faintly sulcate and having on each side of this an abbreviated dull rufous stripe connecting with the sutural line which is also broadly dull rufous; tegulæ yellowish; a line beneath the front wings rufous; scutellum very much elevated, in the shape of a stout, subobtuse tubercle, bright rufous, yellowish behind and black laterally; postscutellum with a yellow spot; metathorax scabrous, black, clothed with short black pubescence; the elevated lines sharply defined. Wings yellowish, apical margins fuliginous, with a violaceous reflection; nervures fuscous, their base, as well as the stigma and costa, yellowish-ferruginous; areolet oblique, slightly petiolated. Legs yellowish-ferruginous; the coxæ and the posterior femora except extreme base and apex, black. Abdomen flattened above, with a slight carina down the middle; basal segment sharply bicarinated, yellowish-ferruginous, the petiole black; the second segment also yellowish-ferruginous; remaining segments yellow, paler towards the apex; the 3rd, 4th and 5th segments above with a subobsolete ferruginous dot on each side. Length 9 lines; expanse of wings 17 lines.

Hab.—Rocky Mountains, Colorado Territory.

Genus HOPLISMENUS, Grav.

Hoplismenus thoracicus, n. sp.

Pale rufous; head, mesothorax, most of hind legs and apex of abdomen, black; a broad annulus on antennæ and a spot on tip of abdomen, white; wings hyaline.

Male.—Head entirely black, palpi pale; antennæ very slender, rather longer than the body, black, the 3rd to 5th joints pale rufous, the 8th to 13th joints white, spotted beneath with blackish. Thorax pale rufous, very finely and closely punctured; mesothorax and pectus, black; scutellum gibbous, acutely carinated on each side, pale rufous, as well as the postscutellum; metathorax finely rugose, the elevated lines sharply defined, the central area moderate, transversely subquadrate, the posterior face obliquely depressed, the lateral tubercles not very prominent, obtuse; tegulæ piceous. Wings hyaline, faintly iridescent; nervures and stigma fuscous, pale at base; areolet small, subtriangular. Legs slender; with their coxæ, pale rufous, the four anterior trochanters, femora and tibiæ more or less dusky; posterior femora, except base, their tibiæ, except a pale annulus near the base, and most of their tarsi, blackish. Abdomen scarcely as long as the head and thorax, subovate, depressed, rufous, apical half of the 3rd, and the remaining segments, black, the extreme apex with a transverse white spot; basal segment strongly arcuated, slightly dilated towards the tip, bicarinated above, and uneven at tip; 2nd segment somewhat rugose. Length 4 lines; expanse of wings 6½ lines.

Hab.—Pennsylvania. Mr. Tryon Reakirt.

Closely allied to *H. dimidiatus* (Europe), but the antennæ are longer and the mesothorax is entirely black.

Genus **CRYPTUS**, Fabr.

SECTION 1.—Scutellum and abdomen black	Sp. 1— 6
“ 2.—Scutellum pale; abdomen black	Sp. 7— 8
“ 3.—Scutellum with pale markings; abdomen red or red and black	Sp. 9—10
“ 4.—Scutellum black; abdomen red or red and black	Sp. 11—24
“ 5.—Thorax, scutellum and abdomen yellowish-red	Sp. 25

SECTION 1.

1. **Cryptus robustus**, n. sp.

Black, shining, abdomen very robust; wings fuliginous, with a bluish gloss; legs rufous, posterior femora undulate, constricted at tip; metathorax with a transverse central area.

Female.—Very robust, deep black, shining; face broad, minutely punctured, with a subobsolete, obtuse, rounded tubercle beneath the antennæ, the front just behind the antennæ deeply excavated, the surface somewhat wrinkled; the orbits behind very narrowly and subobsoletely yellowish; clypeus polished, its lateral and apical margins much depressed, leaving the middle prominent; mandibles also polished, with a few punctures; palpi blackish, fulvous at base; antennæ nearly as long as the body, setaceous, slightly involute, black, the 3rd joint rather longer than the 4th and 5th together, the basal joint robust, tinged with rufous within. Thorax shining above, the dorsal lines deep, but not reaching the posterior margin; mesothorax feebly punctured, the pleura very densely punctured, somewhat aciculate, a spot beneath the posterior wings and the space between the anterior and middle coxæ, polished; scutellum convex, polished, deeply impressed in front; postscutellum also polished; metathorax very densely punctured, opaque, rather truncate behind, the lateral tubercles acute, from each of these tubercles a carina proceeds forward and forms a well-defined, transverse, semicircular central area on the disk. Wings ample, fuliginous, with a bluish gloss, the posterior pair clearer; nervures and stigma black; areolet rather large, subquadrate or 5-angular, the lower nervure broadly angular, the cubital nervure with a rudimental nerve within the first submarginal cell. Legs rufous, polished, the coxæ and trochanters black, the posterior tibiæ and tarsi reddish-brown; femora rather robust, the two posterior pair undulate beneath and somewhat suddenly constricted at tip. Abdomen very robust, ovate, shining black, faintly tinged with blue; basal segment much arcuated, short, polished, flattened above, and broad at tip, which is sulcate on the middle and on each side; venter polished; ovipositor two-thirds as long as the abdomen, black. Length 6—7 lines; expanse of wings 11½—12 lines.

Hab.—Rocky Mountains, Colorado Territory.

2. **Cryptus proximus**, n. sp.

Black; wings fuliginous, with a bluish gloss; legs rufous, femora simple: metathorax with a large, triangular central area.

Female.—Differs from *C. robustus*, to which it is closely allied, as follows:—More elongate and much less robust; the 3rd joint of the antennæ not as long as the 4th and 5th together, the two latter being each two-thirds the length of the 3rd joint; the mesothorax more opaque and densely punctured; the central area of the metathorax is large and triangular; the legs rather longer, the femora slender, simple, not at all undulate beneath or constricted at tips, the 4th, 5th and 6th joints of the posterior tarsi are yellowish; the abdomen more elongate, much less robust, and the ovipositor as long as the body, rufo-piceous, with the valves black. Length 7 lines; expanse of wings 11 lines.

Hab.—Rocky Mountains, Colorado Territory.

3. **Cryptus luctuosus**, n. sp.

Black; frontal orbits whitish; femora rufous; wings smoky, hyaline with a bluish gloss; metathorax without a central area; ovipositor short.

Female.—Black, shining; frontal orbits beneath the antennæ whitish; clypeus polished, a slight prominence between it and the base of the antennæ, behind the latter the front is rather deeply excavated and aciculate; antennæ more than half the length of the body, rather slender, somewhat involute, black, brownish-sericeous towards the tip, basal joint robust and polished, the 3rd and 4th joints about equal in length, the 5th a little shorter. Thorax above polished, minutely punctured, the dorsal lines very deep and large, beneath the wings very densely punctured, a polished spot beneath the posterior wings, as well as the space between the anterior and middle coxæ; scutellum polished; metathorax somewhat rugose, opaque, truncate behind, the carina bordering the truncation sharply defined, the lateral tubercles prominent and subacute. Wings uniformly tinged with fuliginous, and having a bluish gloss; nervures and stigma black; areolet 5-angular, the lower nervure broadly angular. Legs black, polished, all the femora, and the anterior tibiæ and tarsi, rufous. Abdomen short and robust, subovate, shining; the basal segment flattened, strongly arcuated, broad at tip, the peduncle short and polished; ovipositor rather longer than the first segment, rufous, valves black. Length 5 lines; expanse of wings 8½ lines.

Hab.—Rocky Mountains, Colorado Territory.

Shorter and stouter than *C. proximus*, and without any central area on the metathorax.

4. **Cryptus nubilipennis**, n. sp.

Black; antennæ with a white annulus; wings with a fuliginous band across their apical third; legs mostly rufous; ovipositor longer than the body.

Female.—Black; face short and broad, finely punctured; the orbits behind subobsoletely rufous; the front not depressed behind the antennæ; clypeus small, transverse, polished, with a deep puncture on each side; mandibles small, polished, which, as well as the clypeus, is tinged with piceous; antennæ more than half the length of the body, subporrect, rather slender, black, the 8th to 11th joints more or less white, basal joint robust, the 3rd and 4th joints subequal, the 5th and 6th shorter, subequal. Thorax densely and very finely punctured, shining, the dorsal lines not deep; scutellum slightly convex, densely punctured; metathorax finely scabrous, somewhat rounded behind, the elevated lines indistinctly defined, and forming a large, nearly obsolete, rhomboidal central area, the lateral tubercles small. Wings smoky-hyaline, the extreme tips and a broad band on the apical third, not quite reaching the posterior margin of the wing, fuliginous; nervures and stigma black; areolet 5-angular. Legs rather slender, rufous; the coxæ and trochanters black; the four anterior femora at base, apex of the posterior tibiæ and all the tarsi, brownish. Abdomen rather short, robust, subovate; basal segment strongly arcuated, rather longer than the second, flattened, broad at tip and somewhat bilineated; ovipositor longer than the abdomen, rufous, valves black. Length 4½ lines; expanse of wings 8 lines.

Hab.—Rocky Mountains, Colorado Territory.

Allied to *C. luctuosus* but is easily distinguished from that species by the band on the wings.

5. **Cryptus crassicornis**, n. sp.

Black; antennæ much thickened, opaque; frontal orbits white; legs rufous, the tarsi yellowish; wings subhyaline; abdomen slender.

Male.—Deep black, slightly pubescent; face rather long, eyes prominent; the orbits, more or less interrupted on each side near the vertex and beneath the eyes, sometimes ending in a spot on each side of the clypeus, narrowly whitish; clypeus small, prominent, polished; mandibles projecting; basal joint of palpi yellowish; the front behind the antennæ deeply excavated; antennæ nearly as long as the body, opaque black, much thickened at base, and gradually attenuated towards the tip, which is very slender, basal joint robust, subglobular, clothed with black pubescence, 3rd joint about ¼th longer than the 4th, the 5th and 6th joints each as long as the 4th, remaining joints gradually diminish in length, the incisures indistinct. Thorax above shining, not densely punctured, the dorsal lines not deeply impressed, on the pleura the punctures are very dense; beneath the posterior wings a smooth, polished spot, as well as the surface between the anterior and middle coxæ; scutellum subconvex, shining, rather densely punctured; metathorax opaque, scabrous, pubescent, the elevated lines and lateral tubercles not well defined, in some specimens there is a faint indication of a subquadrate central area. Wings subhyaline, faintly tinged with fuliginous, and having a slight bluish gloss; nervures and stigma black; areolet 5-angular or somewhat 4-angular, the cubital nervure with a process within the first submarginal cell. Legs long and rather slender, rufous; four anterior tibiæ in front and the tarsi toward the tips more or less tinged with yellowish, the posterior tibiæ and tarsi sometimes brownish; all the coxæ and the trochanters, black. Abdomen elongate, slender, shining; the basal segment as long as the 2nd, polished, the apical third subquadrate, not much dilated, the lateral tubercles prominent; the remaining segments sometimes faintly tinged with deep blue, and polished towards the apex. Length 6½—7½ lines; expanse of wings 10—11½ lines.

Hab.—Rocky Mountains, Colorado Territory.

Readily distinguished by the incrassate antennæ.

6. **Cryptus velox**, n. sp.

Black; antennæ with a narrow white annulus; legs rufous; wings hyaline, iridescent; ovipositor as long as the abdomen.

Female.—Black; face short and broad; clypeus slightly prominent, polished, with a slight puncture on its disk; mandibles piceous; front behind the antennæ slightly excavated; antennæ nearly as long as the body, slightly involute at tip, black, the 9th to 11th joints white, basal joint robust, piceous beneath, the 3rd, 4th and 5th joints long, subequal, the 6th shorter, about as long as the 7th joint. Thorax polished, finely punctured, the dorsal lines well impressed; scutellum slightly convex, smooth and polished, deeply impressed in front; metathorax shining, finely punctured, the elevated lines not distinct, but forming a small, subobsolete, triangular central area. Wings ample, hyaline, somewhat iridescent; nervures and stigma black, the latter with a pale spot at base; areolet 5-angular or somewhat 4-angular, the lower nervure angular. Legs rather slender, pale rufous, the four anterior tarsi at tips, the apex of the posterior femora, their tibiæ and tarsi, blackish. Abdomen elongate, subovate; basal segment not longer than the second, broad, almost subsessile, flattened above; apical segments polished; ovipositor as long as the abdomen, rufous, valves black. Length 4 lines; expanse of wings 7½ lines.

Hab.—New York. Mr. James Angus.

SECTION 2.

7. **Cryptus excelsus**, n. sp.

Black; antennæ tricolored—fulvous, yellow and black; face, tegulæ, scutellum, posterior face of metathorax, and most of the legs, yellow; basal half of posterior femora, fulvous; wings subhyaline; basal segment of abdomen long and linear.

Female.—Black, shining, slightly pubescent; face, except on each side of the clypeus, frontal orbits not reaching the summit, a short line behind the eyes, the clypeus except its extreme apical margin, the labrum and the palpi, yellow; mandibles projecting, narrow, acute, shining black, between them a tuft of yellowish pubescence; antennæ porrect, two-thirds the length of the body, somewhat thickened, basal joint black, yellow beneath, the 8 following joints fulvous, paler beneath, the 6 following joints yellow, the apical ones black above, fulvous beneath, the 2nd, 3rd and 4th basal joints are blackish above, the 3rd joint nearly as long as the 4th and 5th together. Thorax finely punctured, the dorsal lines deeply impressed; collar above, a line or two spots in front of the mesothorax, tegulæ and a spot behind the posterior wings, yellow; scutellum rather convex, polished, yellow, as well as a line on the postscutellum; metathorax densely punctured, black, with a large subtrefoil, or sometimes an angular, yellow mark on its posterior face, as well as a spot on each side of it, anteriorly there is a curved well-defined carina extending from side to side. Wings subhyaline, stained with fuscous, and having a slight violaceous reflection at tips; nervures fuscous, pale at base, stigma brown; areolet large, slightly oblique, subquadrate or 5-angular, its lower nervure angular. Legs polished, long and slender, especially the posterior pair; the two anterior pairs except their coxæ above, the basal two-thirds of the posterior tibiæ, sometimes a spot on their coxæ behind at base, and their tarsi entirely, yellow; the apical half of the posterior trochanters and the basal half of their femora, bright fulvous; remainder black. Abdomen elongate, fusiform, shining, black; basal segment much longer than the second, linear, not at all dilated, somewhat flattened above, scarcely arcuated, polished and having on each side beyond the middle a prominent tubercle, the apex slightly swollen and often with a yellowish spot on each side, sometimes the lateral margins and under surface of this segment including the petiole, are yellowish; ovipositor nearly as long as the abdomen, rufous or piceous, valves black. Length 6—7 lines; expanse of wings 9—10½ lines.

Variety ♀.—The face black, the frontal orbits, two connected spots beneath the antennæ, a semicircular spot on the clypeus and the labrum, yellow; base of the scutellum black; metathorax entirely black except a subarcuated yellow line posteriorly; abdomen entirely black except the first segment beneath which is tinged with rufous; posterior coxæ immaculate. Length 4½ lines; expanse of wings 7 lines.

Male.—Resembles the female, but much more slender, the antennæ are fuscous above with a broad yellowish annulus, the basal half of the scutellum is black, and the postscutellum, metathorax and abdomen are immaculate, the latter very slender. Length 6 lines.

Hab.—Rocky Mountains, Colorado Territory.

8. **Cryptus junceus,** n. sp.

Black; spots on the face, most of antennæ, scutellum, posterior face of metathorax and the legs, except coxæ and posterior femora, yellow; abdomen very slender, basal segment long and linear.

Female.—Black, shining; frontal orbits, a line on the orbits behind, two spots just beneath the antennæ, most of the clypeus and labrum, and the palpi, yellow; antennæ porrect, nearly as long as the body, yellowish, blackish at base and apex especially above, basal joint black, yellow beneath, the 3rd joint about two-thirds the length of the 4th and 5th together, the incisures indistinct. Thorax densely and finely punctured, the dorsal lines well impressed; collar above, two spots in front of mesothorax, and tegulæ, yellow; scutellum convex, polished, yellow, as well as a narrow line on each side extending to the base of the posterior wings and a spot on the postscutellum; metathorax as in the preceding species, except that the large yellow mark on its posterior face is subtriangular. Wings hyaline, slightly iridescent, the apical margins slightly fuliginous; nervures fuscous, pale at base, stigma brown; areolet large, subquadrate, its lower nervure angular. Legs long and slender, especially the posterior pair, polished, yellow; the coxæ, except a spot at the base of the posterior pair behind, the posterior trochanters and their femora, black. Abdomen elongate, very slender, slightly fusiform; basal segment polished, half again as long as the second segment, cylindric, slightly arcuated, not at all dilated at tip, the lateral tubercles not visible; ovipositor about half the length of the abdomen, rufo-piceous, valves black. Length 6 lines; expanse of wings 9½ lines.

Hab.—Illinois. Dr. Samuel Lewis.

Closely allied to *C. excelsus*, but is much more slender, the basal segment of the abdomen longer, more cylindric, not depressed above and without lateral tubercles, the legs and antennæ are differently colored and the wings clearer.

SECTION 3.

9. Cryptus iridescens, n. sp.

Black; spot on mandibles, palpi, tegulæ, scutellum, four anterior coxæ and trochanters, yellowish-white; legs and abdomen, except tip, pale rufous; the three apical segments black, the 7th with a whitish spot; wings hyaline, beautifully iridescent.

Male.—Black, slightly pubescent; spot on each mandible, and the palpi, yellowish-white; face flat, clypeus shining; antennæ slender, nearly as long as the body, black, the basal joint beneath ferruginous, the joints indistinct. Thorax shining; dorsal lines of the mesothorax tolerably well impressed; pleura finely striated; a line over the collar, tegulæ, a small spot before and another beneath the fore-wing, a large spot on scutellum and the postscutellum, yellowish-white; scutellum polished, the excavation in front longitudinally striated; metathorax finely reticulated, near the base a transverse carina arcuated on the disk, and behind the middle on each side a small, semicircular, transverse carina, in the place of tubercles. Wings hyaline, beautifully iridescent; nervures and stigma pale fuscous; areolet rather large, 5-angular or subquadrate. Legs pale rufous, the four anterior coxæ and trochanters yellowish, as well as the base of the posterior tibiæ and the 2nd, 3rd and 4th joints of their tarsi; base of the posterior trochanters, tips of their femora, rest of their tibiæ and tarsi, blackish or dusky. Abdomen elongate, subclavate, pale rufous, shining; basal segment slightly arcuated, polished, with a small tubercle on each side of the apical third; the three apical segments black, the 7th segment with a rounded white spot above; sometimes the base of the 2nd and apical margin of the 5th segments are blackish. Length 3½ lines; expanse of wings 5½ lines.

Hab.—Delaware. Dr. Thos. B. Wilson.

10. Cryptus soror, n. sp.

Black; most of clypeus and mandibles, palpi, tegulæ, spot on scutellum and 4 anterior trochanters, whitish; wings hyaline, iridescent. Legs and abdomen rufous; basal half of the 2nd, base of the 3rd and 5th, and the apical segments, except a small obscure whitish spot on the 7th, black.

Male.—Black, slightly pubescent, sculptured as in the preceding species; most of the clypeus and mandibles, and the palpi, whitish; antennæ as long as the body, slender, black, basal joint beneath rufous, the joints indistinctly defined; tegulæ, a minute dot beneath the fore-wing, a spot on scutellum and the postscutellum, whitish. Wings hyaline, iridescent; nervures and stigma pale fuscous, yellowish at base; areolet large, subquadrate. Legs pale rufous, the four anterior trochanters, pale yellowish, their coxæ somewhat tinged with yellowish; tips of posterior femora black, their tibiæ, except base which is pale, and their tarsi, dusky. Abdomen elongate, slender, subclavate, pale rufous, shining; basal segment slightly arcuated, polished, with a tubercle on each side of the apical third; basal half of 2nd, basal margins of the 3rd and 5th, and the three apical segments, except an obscure whitish spot on the 7th segment above, black. Length 3 lines; expanse of wings 5 lines.

Hab.—Delaware. Dr. Thos. B. Wilson.

Closely allied to *C. iridescens*, but the antennæ are longer, the areolet of the wings larger, and the abdomen and legs differently colored.

Section 4.

11. **Cryptus americanus**, n. sp.

Black; abdomen rufous; wings subhyaline; opivositor as long as the body.

Female.—Black; apical margin of the clypeus and the frontal orbits, obsoletely whitish; face minutely punctured, much depressed just behind the insertion of the antennæ, and finely and transversely aciculate; between the clypeus and the antennæ there is a small rounded obtuse tubercle; palpi pale fuscous; antennæ nearly as long as the body, very slender, curved at the apex, piceous, the basal joint robust, black, the 3rd and 4th joints nearly equal in length, the 3rd longest, the 5th joint shorter than the 4th, 6th about half the length of the 5th. Thorax very densely and finely punctured; mesothorax with two deeply impressed longitudinal lines, approximate posteriorly; scutellum convex, smooth and polished; metathorax rugose, slightly pubescent, abruptly truncate behind, the lateral angles prominent, acute or subacute. Wings subhyaline, more or less tinged with fuscous; nervures and stigma black; areolet 5-angular or somewhat triangular. Legs black, shining; the four anterior tibiæ and tarsi rufo-piceous, the posterior pair piceous. Abdomen oblong-ovate, bright rufous, shining; the basal segment arcuated, broad at tip, smooth and polished, with a shallow longitudinal groove on each side; ovipositor as long as the abdomen, rufo-piceous, valves black. Length 3–6 lines; expanse of wings 5–10 lines.

Hab.—Delaware (Dr. Wilson); Illinois (Dr. Lewis).

This species varies much in size.

12. **Cryptus persimilis**, n. sp.

Black; legs and abdomen rufous; wings fusco-hyaline; ovipositor nearly as long as the body.

Female.—Black, shining; frontal orbits pale; face minutely punctured, much depressed just behind the insertion of the antennæ; between the clypeus and base of antennæ a rounded obtuse tubercle; clypeus rather prominent, convex, rounded and somewhat depressed in front; palpi piceous; antennæ more than half the length of the body, very slender, slightly curved at tip, black, the 3rd to 6th joints as in *americanus*. Thorax polished, feebly punctured; the mesothorax with two deeply impressed longitudinal lines approximating posteriorly; tegulæ rufo-piceous; scutellum polished; metathorax densely punctured, truncate behind, the elevated lines indistinct. Wings fusco-hyaline, with a brassy gloss; nervures fuscous, stigma ferruginous: areolet 5-angular. Legs rufous, the coxæ and trochanters black; tips of posterior tibiæ and their tarsi somewhat obfuscated. Abdomen oblong-ovate, shining, basal segment much arcuated, polished, sides slightly grooved, broad at tip, most of the petiole blackish; ovipositor nearly as long as the abdomen, rufous, valves black. Length 4 lines; expanse of wings 7 lines.

Hab.—Delaware. Dr. Thos. B. Wilson.

Closely allied to *C. americanus*, but is at once distinguished by its red legs and darker wings.

13. **Cryptus limatus**, n. sp.

Black; antennæ with a more or less distinct whitish annulus; abdomen rufous, polished; ovipositor very short.

Female.—Black, shining; face densely and minutely punctured, coarser on the clypeus, the anterior margin of which is rounded and somewhat reflexed; mandibles tinged with rufous, pubescent; cheeks and occiput polished; antennæ as long as the body, rather slender, black, brownish beneath especially towards the apex, the 10th to 12th joints above, white, the 3rd, 4th, 5th and 6th joints subequal, the 6th rather the shortest. Thorax very densely and finely punctured, shining, the mesothorax with a shallow depressed line on each side; scutellum convex, finely punctured; metathorax short, truncate behind. somewhat longitudinally rugose, near the base a transverse acute carina extending all the way across, behind this another acute carina slightly oblique and interrupted in the middle and terminating on each side in a short subacute tubercle. Wings subhyaline, more or less tinged with fuscous; nervures and stigma black; areolet 5-angular or somewhat 4-angular, the anterior and lateral nervures equal, the posterior nervure angular. Legs black, the anterior tibiæ and all the tarsi more or less tinged with pale rufous. Abdomen ovate, robust, bright rufous, highly polished; basal segment somewhat flattened, the apical third rather suddenly quadrate, the lateral angles prominent, extreme base of the petiole blackish; ovipositor very short, scarcely as long as the second segment. Length 4½—5 lines; expanse of wings 7—8 lines.

Hab.—Delaware and Virginia. Dr. Thos. B. Wilson.

Resembles *C. americanus*, but is more robust, the abdomen is highly polished, the areolet of the wings is quadrate, and the ovipositor is scarcely one-fourth as long as in that species.

14. **Cryptus similis**, n. sp.

Black: antennæ above with a white annulus; abdomen and most of the legs, rufous; posterior tarsi with a broad white annulus; wings almost hyaline.

Female.—Black, shining, clothed with a short pale pubescence, more obvious in certain lights; face densely punctured, the clypeus rounded in front, the margin somewhat reflexed and polished; palpi pale; antennæ as long as the body, black, sometimes tinged with rufous beneath, the 8th to 12th joints white above, the 3rd to 6th joints proportioned as in *limatus*, but longer and slenderer. Thorax shining, densely punctured; tegulæ whitish; metathorax sculptured as in *limatus*. Wings almost hyaline, very faintly tinged with fuliginous; nervures and stigma black; areolet quadrangular, as in *limatus*. Legs rufous, the four anterior pair paler in front; the coxæ, trochanters, tips of the posterior femora, and their tibiæ black; posterior tarsi black, the second, third and fourth joints white. Abdomen oblong-ovate, rufous, highly polished; basal segment much arcuated, elongate and slender, not much dilated at tip, the apical third subquadrate, the angles not prominent; ovipositor shorter than the abdomen. Length 4 lines; expanse of wings 7 lines.

Hab.—Delaware. Dr. Thos. B. Wilson.

Closely resembles *C. limatus*, but is smaller and distinguished at once by the color of the legs, which is mostly rufous, with the posterior tarsi mostly white; the basal segment of the abdomen is more linear and not so abruptly quadrate at the tip.

This and the three preceding species are remarkably similar in their general appearance, but may be readily distinguished by the following characters:—

C. americanus has the antennæ very slender, except the basal joint, and entirely black, the 6th joint about ¼th the length of the 3rd; the face just beneath the antennæ has a small, obtuse, rounded tubercle; the clypeus is small and rather prominent; the mesothorax has two deeply impressed lines; the areolet of the wings is 5-angular or subtriangular; the legs are almost entirely black; the abdomen is shining, but not polished, and the ovipositor is about as long as the abdomen.

C. persimilis has all the characters of *americanus*, except that the legs are mostly rufous instead of black.

C. limatus is more robust; has the antennæ much stouter and annulated, the 6th joint nearly as long as the 3rd; the face broader, shorter and without the frontal tubercle; the clypeus is twice as large and not prominent, but broadly rounded in front; the mesothorax has no deeply impressed lines; the areolet of the wings is almost quadrate; the metathorax has two transverse carinæ; the legs are almost entirely black, but shorter; the abdomen is ovate, more robust, highly polished, the basal segment flattened and suddenly quadrate at tip, and the ovipositor is very short.

C. similis has all the characters of *limatus*, except that it is smaller, less robust, the antennæ rather longer, more slender and the joints longer, the legs mostly rufous, the posterior tarsi broadly annulated with white, the basal segment of the abdomen more linear and the ovipositor longer.

15. **Cryptus albitarsis**, n. sp.

Black, densely sculptured; most of legs and abdomen except tip, rufous; posterior tarsi white; wings subhyaline.

Male.—Robust, black, densely sculptured, slightly pubescent; head densely punctured, face flat, clypeus shining, palpi fuscous; antennæ about as long as the body, rather slender, black, 2nd joint beneath and extreme base of the 3rd, rufous, the joints rather indistinct, the 3rd longest, 4th shorter and subequal with the two or three following joints. Thorax finely and densely rugose, somewhat shining; mesothorax densely punctured, the dorsal lines not well impressed; scutellum flat, punctured; metathorax more coarsely rugose, somewhat reticulated, a well-defined transverse carina at base, and another one a little behind the middle, slightly arcuated and subobsolete in the middle and more prominent and acute on each side where the tubercles are usually placed; tegulæ black. Wings hyaline, faintly tinged with fuscous; nervures and stigma black; areolet large, subquadrate. Legs rufous, their coxæ and trochanters, except the apical half of the posterior pair, black; posterior femora at tip and their tibiæ dusky, their tarsi white, the extreme base and apex black. Abdomen oblong-subovate, not much longer than the head and thorax, rufous, polished; apical two-thirds of the 5th, and the whole of the following segments, black; on the apical third of the 3rd and 4th segments a transverse, rather indistinct, blackish line; basal segment protuberant at tip, with a well-developed tubercle on each side of the apical third; 2nd segment broad and flattened, the basal foveæ shallow. Length 3½ lines; expanse of wings 6 lines.

Hab.—Delaware. Dr. Thos. B. Wilson.

Easily distinguished by its robust form, short abdomen, dense sculpture and white posterior tarsi.

16. Cryptus pumilus, n. sp.

Black; smooth, base of antennæ, legs, and abdomen, except 1st segment, rufous; wings subhyaline; basal segment of abdomen black, striated.

Female.—Black, shining; mandibles and palpi testaceous; antennæ more than half the length of the body, rather stout, blackish, the basal third pale rufous. Thorax smooth and polished; scutellum flattened, smooth and polished, with a transverse, striated excavation in front; metathorax with the elevated lines sharply defined, the central area large, reniform and striated obliquely, the posterior declivity rather abrupt and also striated, the lateral tubercles prominent; tegulæ yellowish. Wings hyaline, the anterior pair slightly tinged with fuscous, iridescent; nervures and stigma pale at base, the latter rather large; areolet small, 5-angular. Legs, with their coxæ, entirely pale rufous, the posterior tibiæ at tips, dusky. Abdomen ovate, long and slender at base, somewhat flattened, polished, rufous; basal segment black, long, slender, gradually dilated towards the tip, which is longitudinally striated above, and with two longitudinal carinæ extending nearly the whole length of the segment, the lateral tubercles not visible, the extreme lateral margins at tip, yellow; the following segments together ovate, apical segment slightly tinged with yellowish; ovipositor very short, rufous. Length 2¼ lines; expanse of wings 4 lines.

Hab.—Delaware. Dr. Thos. B. Wilson.

17. **Cryptus subargenteus**, n. sp.

Black, silvery-sericeous; legs and abdomen, except 1st segment, rufous; wings hyaline, iridescent.

Female.—Black, clothed with a very fine silvery-sericeous pile, most obvious on the face; head rather large, transverse; face short and broad; eyes prominent; clypeus, vertex, occiput and cheeks, polished; a spot on each mandible, and the palpi, whitish; antennæ three-fourths the length of the body, slender, brown, tinged with rufous at base and beneath. Thorax polished; mesothorax with the dorsal lines well impressed; scutellum flat, polished; metathorax pubescent, with the elevated lines sharply defined, the central area large, elongate-subquadrate; tegulæ pale yellowish. Wings hyaline, faintly tinged with fuscous, iridescent; nervures and stigma fuscous; areolet small, 5-angular or subquadrate. Legs slender, pale rufous, the four anterior coxæ and trochanters whitish, the posterior tibiæ and tarsi slightly dusky. Abdomen elongate, slender, strongly arcuated, shining; the 1st segment long, linear, black, polished, slightly dilated at tip, with an obtuse tubercle on each side of the middle; 2nd and following segments together oblong-ovate, subsericeous, rufous, faintly tinged with dusky at tip; ovipositor about as long as the basal segment of the abdomen, rufous, valves blackish. Length 3 lines; expanse of wings 5 lines.

Hab.—Pennsylvania. E. T. Cresson.

Distinguished at once from the other species by the silvery face.

18. **Cryptus pusillus**, n. sp.

Black; most of antennæ, legs and 2nd segment of abdomen, rufous; 1st segment of the latter striated; wings subhyaline.

Female.—Black, polished, slightly pubescent; mandibles piceous, palpi pale; antennæ two-thirds the length of the body, rather short, pale rufous, fuscous towards the tip. Thorax shining, minutely punctured; metathorax with the elevated lines sharply defined, the central area rather large and triangular, and immediately behind it the posterior face is abruptly and deeply excavated, the lateral tubercles prominent; tegulæ pale rufous. Wings subhyaline, uniformly tinged with pale rufous, slightly iridescent; nervures and stigma fuscous, the latter rather large; areolet small, 5-angular. Legs, with their coxæ, entirely pale rufous. Abdomen ovate, flattened, polished, black, the 2nd segment entirely and the anterior margin of the 3rd obscurely, rufous, as well as the lateral margins of the 1st segment, this segment is dilated towards the tip and covered above with fine longitudinal striæ, the lateral tubercles are subobsolete; apical segment slightly tinged with yellowish; ovipositor nearly as long as the abdomen, piceous. Length 2¼ lines; expanse of wings 4 lines.

Hab.—Illinois. Dr. Samuel Lewis.

Allied to *C. pumilus*, but only the middle of the abdomen is rufous.

19. **Cryptus frater**, n. sp.

Black; legs and the 2nd, 3rd and 4th abdominal segments, rufous; wings subhyaline; ovipositor short.

Female.—Black, finely sculptured, slightly pubescent; face flat, palpi fuscous; antennæ nearly as long as the body, slender, piceous, tinged with ferruginous towards the middle, the joints distinct, 3rd joint longest, 4th slightly shorter, and the remaining joints gradually shorter. Thorax: mesothorax shining, minutely punctured, the dorsal lines not well impressed, under a strong lens distinctly and closely punctured; pleura and pectus minutely striated, subopaque; metathorax finely rugose, subopaque, near the base a well-defined transverse carina slightly arcuated in the middle, and on each side behind a short carina where the tubercles are usually placed. Wings subhyaline, faintly iridescent; nervures and stigma fuscous; areolet moderate, 5-angular or subquadrate. Legs rufous, their coxæ and trochanters black, the posterior tarsi slightly dusky. Abdomen, oblong-ovate, very slender at base, polished, black, the 2nd, 3rd and 4th segments rufous; basal segment slender, arcuated, its tip piceous, and on each side of the apical third a stout tubercle, between which there is a deep fovea; ovipositor short, not as long as the 1st segment of the abdomen, piceous, valves black. Length 3¼ lines; expanse of wings 5 lines.

Hab.—Illinois. Dr. Samuel Lewis.

20. **Cryptus subgracilis**, n. sp.

Rather slender, black; antennæ piceous; legs fuscous, the two anterior pairs pale; abdomen rufous, apex black; wings fusco-hyaline.

Female.—Black, slightly pubescent; head densely and finely punctured, face flat, clypeus shining; antennæ nearly as long as the body, slender, piceous, basal joint black, 3rd joint longest, 4th and 5th subequal, each one-third shorter than the 3rd, the joints distinct. Thorax: mesothorax shining, closely punctured, the dorsal lines obsolete; pleura minutely rugose or striated; scutellum rather convex, punctured; metathorax finely rugose, or somewhat reticulated, a well defined, transverse, arcuated carina at base, and on side behind, an oblique, slightly angular, well defined carina; tegulæ black. Wings pale fusco-hyaline, slightly iridescent; nervures and stigma black; areolet large, subquadrate. Legs fuscous, their coxæ black, the four anterior tibiæ and tarsi tinged in front with obscure yellowish. Abdomen very slender at base, remaining segments together, oblong-ovate, polished, rufous, the 3 apical segments black; basal segment long, arcuated, without lateral tubercles; ovipositor about as long as the 1st segment of abdomen, rufous, valves black. Length 2½ lines; expanse of wings 4½ lines.

Hab.—Illinois. Dr. Samuel Lewis.

More slender than *C. frater* to which it is closely allied, but sufficiently distinct.

21. Cryptus extrematis, n. sp.

Black; antennæ with a broad white annulus; legs and three basal segments of abdomen rufous, large spot on the 6th or 7th segment and the posterior tarsi, white; wings clear; ovipositor nearly as long as the abdomen.

Female.—Black, shining, somewhat robust; head short and broad; antennæ as long as the body, slender, black, the 7th to 12th joints white, the 3rd and 4th joints long, the 3rd rather the longest, 5th a little shorter than the 4th, and the 6th about half as long as the 3rd. Thorax finely punctured, the dorsal lines rather deep; scutellum subconvex, polished; metathorax finely scabrous, opaque, its base smoother and shining, the elevated lines tolerably well defined, forming a large, more or less distinct, subrhomboidal central area, lateral tubercles not well defined. Wings faintly tinged with fuscous; nervures and stigma blackish, pale at base; areolet large, subquadrate. Legs pale rufous, the posterior femora and tibiæ at tips, and the base and apex of their tarsi, blackish, rest of their tarsi white. Abdomen rather stout, subovate, polished, rufous or yellowish-rufous; basal segment strongly arcuated, broad at tip; the 4th and following joints black, the 6th or 7th or both more or less white above; ovipositor about as long as the body, rufous, valves black. Length 4—5½ lines; expanse of wings 6—9½ lines.

Male.—Resembles the female, but much slenderer, the antennæ is more or less yellowish or whitish beneath, the four anterior coxæ are white, as well as the posterior tarsi except extreme tips; the abdomen much more elongate and subcylindric, the basal segment mostly all black, linear, with a projection on each side behind the middle, the 2nd, 3rd and most of the 4th segments are rufous, the 7th, and sometimes the 6th, segment has a rounded white spot above. Length 4½ lines; expanse of wings 7 lines.

Hab.—Mass. (Sanborn); Penn. (Auxer); Delaware (Dr. Wilson).

This is closely allied to *C. nuncius* Say, but is at once distinguished from that species by having the white spot or spots on the apex of the abdomen, otherwise they are very similar.

22. Cryptus ultimus, n. sp.

Black; the legs and four basal segments of the abdomen pale rufous, rest of the abdomen black except a large white spot on the seventh segment; wings subhyaline; ovipositor nearly as long as the abdomen.

Female.—Black, shining, robust; head short and broad, entirely black; antennæ rather more than half the length of the body, brown-black, black at base, the 3rd and 4th joints long and subequal, 5th shorter, 6th shorter than the 5th. Thorax densely and finely punctured, opaque, the dorsal lines not deep; scutellum polished; metathorax densely punctured, opaque, the elevated lines tolerably well defined, the lateral tubercles small, acute. Wings slightly tinged with fuscous; nervures and stigma pale fuscous; areolet large, subquadrate or 5-angular, the lower nervure broadly angular, the outer nervure rather shorter than the inner nervure. Legs pale rufous, tips of the four posterior femora and of their tibiæ, black. Abdomen robust, ovate, pale rufous, shining; basal segment arcuated, broad at tip, slender at base, polished; the 5th and apical segments black, polished, the seventh segment above with a large white spot posteriorly, the fourth segment above is somewhat stained with blackish posteriorly; ovipositor nearly as long as the abdomen, rufous, valves black. Length 4 lines; expanse of wings 6 lines.

Hab.—Rocky Mountains, Colorado Territory.

Closely allied to *C. extrematis*, but readily distinguished by its much shorter and entirely black antennæ and by the coloring of the posterior legs.

23. Cryptus incertus, n. sp.

Black; antennæ slightly annulated with white; legs and abdomen bright rufous, the 3 apical segments of the latter black, the terminal one with a large white spot above; wings fusco-hyaline.

Female.—Black, finely and densely punctured, subopaque, slightly pubescent; face flat; clypeus shining; mandibles rufous in the middle; palpi piceous; antennæ slender, two-thirds the length of the body, piceous, paler beneath towards the base and again towards the tip, about the middle above a small whitish annulus, 3rd and 4th joints long and subequal, 5th joint shorter, the 6th shorter than the 5th. Thorax finely rugose, the mesothorax indistinctly so, the dorsal lines not well impressed; metathorax more coarsely rugose, or reticulated, near the base a slight transverse carina, and about the middle another one strongly arcuated anteriorly and ending on each side in a prominent flattened ridge or tubercle; tegulæ rufous. Wings subhyaline, uniformly tinged with pale fuscous, slightly iridescent; nervures and stigma fuscous; areolet large, subquadrate. Legs, with their coxæ, bright rufous; tips of the posterior femora black, tips of their tibiæ and of all the tarsi dusky. Abdomen oblong-ovate, strongly arcuated at base, smooth and polished, bright rufous; apical margin of the 4th segment, and the remaining segments entirely, except a large white spot on the 7th segment above, black; ovipositor more than half the length of the abdomen, rufo-piceous, valves black. Length 3½ lines, expanse of wings 6 lines.

Hab.—Delaware. Dr. Thomas B. Wilson.

Closely allied to *C. ultimus*, but the antennæ are longer, with a slight white annulus, the wings darker, and the abdomen not so robust.

24. Cryptus alacris, n. sp.

Black; annulus on antennæ and spot on tip of abdomen, white; legs and three basal segments of abdomen, rufous; wings hyaline; ovipositor as long as the abdomen.

Female.—Black, shining, slightly pubescent; mouth piceous, palpi pale; antennæ more than half the length of the body, rather slender, black, with a whitish annulus about the middle, basal joints beneath sometimes pale rufous. Thorax minutely punctured; mesothorax smooth and polished; a line over the collar, sometimes subobsolete, and tegulæ, whitish; metathorax subopaque, minutely rugose, the elevated lines longitudinal and subobsolete, the posterior face deeply excavated, and sometimes tinged with rufous, lateral tubercles scarcely visible. Wings ample, hyaline, iridescent; nervures and stigma black; areolet moderate, 5-angular. Legs, with their coxæ, entirely rufous, moderate. Abdomen oblong-ovate, slender at base, rather broad and sometimes slightly compressed at tip, shining, the three basal segments rufous, the remainder black, with a white spot at tip above; basal segment gradually dilated towards the tip, without lateral tubercles; ovipositor as long as the abdomen, rufo-piceous. Length 2¾ lines, expanse of wings 4½ lines.

Hab.—Delaware (Dr. Wilson); Illinois (Dr. Lewis).

Resembles *C. incertus*, but is much smaller, the antennæ shorter and stouter, the wings clear, ovipositor longer, and the color somewhat different.

SECTION 5.

25. **Cryptus pallidus**, n. sp.

Pale honey-yellow; head black, face rufous; antennæ black with a white annulus; collar, tegulæ and spot on tip of abdomen, white; wings hyaline.

Female.—Pale honey-yellow; head black, most of face, clypeus, and mandibles, rufous; palpi pale; antennæ more than half the length of the abdomen, rather slender, black, with a broad white annulus about the middle, the three or four basal joints, especially beneath, pale rufous. Thorax shining; mesothorax polished; the dorsal lines tolerably well impressed; scutellum slightly convex, polished; metathorax minutely rugose, subopaque, the elevated lines not well defined, longitudinal, the central area very elongate, broad behind and narrowed in front, the posterior declivity abrupt, the carina bounding it above sharply defined, and ending on each side in a short subacute tubercle. Wings hyaline, faintly tinged with yellowish, iridescent; nervures and stigma pale testaceous; areolet 5-angular, moderate. Legs rather slender, color of the body; the coxæ tinged with yellowish. Abdomen about as long as the head and thorax, oblong-ovate, slender at base, faintly compressed at tip; three basal segments opaque, apical segments polished, with an obscure whitish spot at extreme tip above; basal segments gradually dilated towards the tip, without lateral tubercles; ovipositor two-thirds the length of the abdomen, piceous. Length 3½ lines; expanse of wings 5½ lines.

Hab.—Delaware. Dr. Thomas B. Wilson.

PHYGADEUON, Grav.

1. **Phygadeuon major**, n. sp.

Black; antennæ with a yellowish annulus; legs and abdomen, except base, rufous, apex with a yellow spot; wings subhyaline.

Female.—Black, shining, clothed with a short, fine, yellowish pubescence, more obvious when viewed in profile; face densely and finely punctured; clypeus polished, tinged with rufous, with a deep fovea on each lateral suture, mandibles also tinged with rufous; palpi testaceous; antennæ rather short, stout, involute at tip, black, the 8th to 12th joints yellow, the three basal joints tinged with rufous, beyond the annulus beneath the joints are obscurely ferruginous. Thorax shining, finely and closely punctured, the mesothorax flattened, less distinctly punctured; scutellum polished, obscure rufous, as well as a transverse spot behind it; metathorax rugose, a rather large subquadrate, almost smooth, shining space on each side at base, the elevated lines sharply defined, the central area moderate, 6-angular, posterior face suddenly depressed and bounded above by a sharply defined carina, arcuated in the middle and prominent on each side; tegulæ rufous. Wings hyaline, slightly tinged with yellowish; nervures and stigma ferruginous; areolet 5-angular. Legs stout, rufous; posterior coxæ, except tips, black, their femora and tibiæ at tips blackish. Abdomen stout, about as long as the head and thorax, ovate, highly polished, rufous, base of the 1st segment black, its tip broad, the petiole short and stout, on the apical third two short well defined longitudinal carinæ, and the lateral margins also acutely carinated; apical segment with a large yellow spot; ovipositor short, rufous. Length 4¾ lines; expanse of wings 7 lines.

Hab.—Illinois. Dr. Samuel Lewis.

This is the largest species of this genus so far known to me.

2. **Phygadeuon annulatus**, n. sp.

Black; annulus on antennæ, tegulæ, and spot on apex of abdomen, whitish; legs and abdomen, except three apical segments, rufous; wings subhyaline.

Female.—Black, shining; face punctured, the vertex, occiput and cheeks polished; most of the clypeus, the mandibles and palpi, pale rufous; antennæ more than half the length of the body, rather stout, fuscous, tinged with rufous at base and again towards the tip, the 7th to 12th joints white, not so broad beneath. Thorax minutely sculptured, shining; mesothorax polished, somewhat flattened, apparently impunctured, the dorsal lines tolerably well impressed; metathorax indistinctly sculptured, the elevated lines obsolete, abruptly truncate behind; tegulæ pale yellowish. Wings subhyaline, tinged with pale fuscous; nervures and stigma pale fuscous, paler at base; areolet 5-angular. Legs, with their coxæ, rufous, the posterior tibiæ dusky at tips. Abdomen subovate, somewhat flattened, about as long as the head and thorax, rufous, shining; base of the 1st and the three apical segments, except a pale yellowish spot on the last segment above, black; apical half of 1st segment dilated and truncate, the petiole stout; ovipositor rather more than half the length of the abdomen. Length 3 lines; expanse of wings 5 lines.

Hab.—Delaware. Dr. Thomas B. Wilson.

3. **Phygadeuon cincticornis**, n. sp.

Black, polished; annulus on antennæ and spot on tip of abdomen, yellowish; mouth, legs and three basal segments of abdomen, rufous; wings hyaline; ovipositor long.

Female.—Black, polished, slightly pubescent; most of the face, clypeus, mandibles, except tips, and palpi, dull rufous; antennæ about as long as the head and thorax, stout, black, the three basal joints beneath rufous, the 9th to 12th joints pale yellowish, spotted with blackish beneath, basal joint very robust. Thorax polished, minutely punctured; dorsal lines of mesothorax obsolete; scutellum flattened, punctured; metathorax minutely sculptured, the sides pubescent and shining, the elevated lines tolerably well defined, the central area elongate, narrow; tegulæ piceous. Wings hyaline, slightly iridescent; nervures and stigma black, pale at base; areolet 5-angular. Legs, with their coxæ, entirely rufous. Abdomen elongate, polished, dull rufous, the 4th and following segments black, the apex with a small yellowish spot; basal segments slightly and gradually dilated to the tip, without lateral tubercles; ovipositor as long as the abdomen, rufous. Length 3½ lines; expanse of wings 6 lines.

Hab.—Illinois. Dr. Samuel Lewis.

4. **Phygadeuon montanus**, n. sp.

Black, polished; antennæ, legs and abdomen, dull rufous; wings subhyaline; metathorax deeply excavated behind.

Female.—Black, polished, thinly clothed with pale pubescence; head subquadrate; face, beneath the antennæ, slightly protuberant; mouth piceous, palpi pale; antennæ short and stout, involute, rufous, with a white sericeous pile. Thorax polished, without distinct punctures; mesothorax flattened, with a few subobsolete punctures on the disk; scutellum flat, with two deep, subtransverse excavations in front; metathorax almost smooth, shining, the elevated lines distinct, the central area large and semicircular, and immediately behind it a very deep, abrupt, arcuated excavation, the carina bounding it in front ends each side in an obtuse flattened tubercle; tegulæ rufous. Wings subhyaline, slightly iridescent, the anterior pair tinged with fuscous, the posterior pair clearer; nervures fuscous, paler at base, stigma black; areolet subquadrate, moderate. Legs thickened, rufous, clothed with a short whitish pile; most of the posterior coxæ and their femora, as well as the middle femora slightly, more or less blackish. Abdomen about as long as the head and thorax, flattened, highly polished, subovate, dark rufous, sides blackish; first segment robust, arcuated, broadly dilated at tip, with a slight tubercle on each side of the posterior third, petiole short and stout; apical segments slightly incurved; ovipositor short, rufous. Length 3¼ lines; expanse of wings 5 lines.

Hab.—Rocky Mountains, Colorado Territory.

5. **Phygadeuon vulgaris**, n. sp.

Black; basal two-thirds of antennæ, legs and abdomen, rufous; wings subhyaline; metathorax deeply excavated behind.

Female.—Black, shining, slightly pubescent; head subquadrate, mandibles dull rufous, palpi pale yellowish; antennæ short and stout, basal two-thirds pale rufous, often paler towards the middle, apical third piceous, basal joint robust, elongate. Thorax polished, densely and minutely punctured; mesothorax somewhat flattened; scutellum flat, polished, sparsely punctured, with two deep, slightly transverse excavations in front; metathorax finely rugose, with a polished space on each side at base enclosed by elevated lines, which are tolerably distinct, the central area rather large, transversely and irregularly subquadrate, immediately behind it a very deep, abrupt, arcuated excavation, and on each side of it a prominent, flattened, obtuse tubercle; tegulæ rufous. Wings hyaline, slightly but uniformly tinged with fuscous, faintly iridescent; nervures and stigma fuscous; areolet moderate. Legs, with their coxæ, pale rufous, posterior pair darker and often more or less dusky. Abdomen about as long as the head and thorax, ovate, flattened, highly polished, bright rufous, the extreme base sometimes blackish and the extreme apex sometimes slightly yellowish and pubescent; basal segment squarely dilated at tip, forming a slight angle on each side about the middle, petiole short and stout; ovipositor about half the length of the abdomen, rufous. Length 2½—3½ lines; expanse of wings 4½—5½ lines.

Hab.—Penn., Del. (Dr. Wilson); Illinois (Dr. Lewis). Ten ♀ specimens.

This is our most common species; it varies much in size, and the rufous color is sometimes very pale, the antennæ are always black at tips and in some specimens there is a more or less pale annulus, the rufous color at base gradually shading into pale yellowish towards the middle.

6. **Phygadeuon subfuscus**, n. sp.

Black, shining; base of antennæ, legs and abdomen, except base, dark rufous; wings subhyaline; metathorax excavated behind; ovipositor very short.

Female.—Black, polished; head transversely subquadrate, entirely black; palpi pale; antennæ half the length of the body, stout, rufous, gradually shading into fuscous towards the apex. Thorax minutely punctured; mesothorax somewhat flattened, polished and feebly and sparsely punctured; scutellum triangular, slightly depressed, with a transverse, rather deep excavation in front; metathorax finely sculptured, a large shining space on each side at base, the elevated lines distinct, the central area moderate, semicircular, and immediately behind it a deep, abrupt excavation, the tubercle on each side scarcely visible. Wings hyaline, faintly tinged with pale fuscous; nervures and stigma pale fuscous, paler at base; areolet 5-angular. Legs, including the coxæ, rufous, the posterior tibiæ and tarsi dusky. Abdomen as long as the head and thorax, ovate, flattened, polished, dark rufous or rufo-fuscous; basal segment black, gradually dilated towards the tip, carinated laterally and with a shallow fovea on the disk, petiole rather short and stout; ovipositor subexserted. Length 3½ lines; expanse of wings 5½ lines.

Hab.—Illinois. Dr. Samuel Lewis.

7. **Phygadeuon mandibularis**, n. sp.

Black; mandibles, base of antennæ, tegulæ, legs and abdomen, rufous; wings subhyaline; mandibles very large and pubescent.

Female.—Black, shining, slightly pubescent, more dense on the face;

head densely punctured; clypeus very transverse, fringed with pale pubescence, and tinged with dark rufous; mandibles very prominent, long and rather slender, deeply bifid at tips, which are black, the rest rufous and pubescent; palpi pale rufous; antennæ short and stout, involute, rufous at base, yellowish in the middle, and fuscous at tip, the apical third beneath tinged with rufous. Thorax densely and finely punctured; mesothorax and scutellum flattened, the latter with two deep, slightly transverse excavations in front; elevated lines of the metathorax sharply defined, the central area rather large, transverse and irregular, on each side of it are two spaces, the basal one large, somewhat rounded, smooth and shining, the posterior one smaller, oblique, irregular and striated, posterior declivity abrupt, the lateral tubercles scarcely visible; tegulæ rufous. Wings subhyaline, slightly and uniformly tinged with fuscous; nervures fuscous, stigma pale fulvous; areolet 5-angular. Legs, with their coxæ, rufous, pubescent. Abdomen subovate, polished, dark rufous; basal segment gradually dilated towards the tip which is broad and depressed, without lateral tubercles; ovipositor short, rufous. Length 3¾ lines; expanse of wings 5¾ lines.

Hab.—Illinois. Dr. Samuel Lewis.

Easily distinguished from all the other species known to me by the very prominent mandibles.

Genus **MESOSTENUS**, Grav.

1. **Mesostenus albopictus**, n. sp.

Black, variegated with white markings; antennæ long, with a broad white annulus; legs yellow, posterior pair very long, mostly black; wings hyaline; abdomen banded with white; metathorax with two acute spines or tubercles.

Male.—Black, shining, slightly pubescent; face beneath the antennæ, orbits, very broad behind, clypeus, labrum, base of mandibles, and the palpi, white; antennæ longer than the body, porrect, the 12th to 19th joints white. Thorax black, shining, densely punctured, the dorsal lines deeply impressed; a line on the collar above and sides, a line or spot in front of the anterior coxæ, a round spot on the disk of mesothorax, tegulæ, a broad sutural line before and a spot beneath the fore-wings, a large, elongate, irregular mark on each side of the pleura, as well as a slightly oblique line just beneath it in front of the middle coxæ, and a large transverse mark immediately behind the posterior wings, all white; scutellum subconvex, shining, punctured, its apex white as well as a narrow marginal line extending to the base of the posterior wings; the carina on each side in front of the scutellum and a spot on postscutellum, also white; metathorax coarsely and confluently punctured, clothed with pale pubescence, the transverse carina in front sharply defined, the lateral tubercles strongly developed and acute; a broad, elongate mark on each side constricted and pointed before, two short, approximate lines in front of the tubercles sometimes confluent with them, and two broad lines covering the tubercles and extending to the posterior margin where they become confluent with the lateral marks, all white. Wings hyaline, sometimes faintly tinged with fuscous; nervures and stigma black; areolet minute, quadrate. Legs long and slender, especially the posterior pair, pale yellowish; the four anterior coxæ and trochanters and a broad line on the posterior coxæ behind, white; rest of the posterior coxæ, their trochanters at base, their femora entirely, the apical fourth of their tibiæ, and extreme tips of all the tarsi, black. Abdomen short, slender, fusiform, about as long as the head and thorax, black, polished; the peduncle, and apical margins of all the segments, broadly white. Length of body 6 lines, of antennæ 7 lines, of posterior legs 10 lines; expanse of wings 11½ lines.

Hab.—Delaware. Dr. Thos. B. Wilson.

This is a very conspicuous species and readily distinguished by its very elongate antennæ and posterior legs, in which respect it resembles certain species of the genus *Arotes*.

2. **Mesostenus albomaculatus**, n. sp.

Black; antennæ with a broad white annulus; orbits, spot on clypeus and mandibles, a round spot on the disk of thorax and several on the sides, scutellum, two large oval spots on metathorax, and apical margins of the abdominal segments, white; legs pale fulvous, posterior pair varied with black and white; wings hyaline; ovipositor short.

Female.—Black, slightly pubescent; the orbits interrupted behind and very broad on the cheeks, a spot on the clypeus, middle of mandibles and the palpi, white; antennæ rather longer than the body, porrect, black, the 9th to 13th joints white, spotted beneath with black. Thorax densely punctured, the dorsal lines rather deeply impressed in front, obsolete behind; a round spot on the disk of the mesothorax, tegulæ, an elongate spot before and another beneath the anterior wings, a large spot just behind the posterior wings, another on each side of the pleura and a line on each side of the pectus, white; scutellum polished, with a large white spot covering almost its entire surface, behind it a small transverse spot; metathorax finely scabrous, opaque, the anterior carina well defined, the lateral tubercles prominent but obtuse, on each side posteriorly a large oval white spot covering the tubercles. Wings hyaline; nervures and stigma black; areolet larger than usual, quadrate. Legs pale fulvous, the anterior and middle coxæ, a large spot on the posterior coxæ, an annulus near the base of their tibiæ and their tarsi, except extreme base and apex which are black, white; rest of posterior coxæ and tibiæ and the extreme tips of their femora black. Abdomen robust, ovate, shining, black, densely and finely punctured; basal segment about as long as the second, stout, the apex broad, convex and rather deeply punctured, petiole short and robust, flattened and polished; apical margins of all the segments white. those of the three basal segments broad; apical segments polished; ovipositor short, scarcely half the length of the abdomen, rufo-piceous. valves black. Length 5 lines; expanse of wings 9 lines.

Hab.—Pennsylvania. Mr. George Newman.

More robust than *M. albopictus*, with the posterior legs much shorter. The ornamentation is, however, very different.

3. **Mesostenus thoracicus**, n. sp.

Yellowish-rufous; head, antennæ, mesothorax and pectus, black, with white lines; antennæ with a broad white annulus; ovipositor as long as the abdomen; posterior tarsi ⅗, white.

Female.—Head black; orbits, interrupted behind and broad on the cheeks, a large spot on the face just beneath the antennæ sometimes confluent on each side with the orbits, the clypeus, labrum, spot on mandibles, and the palpi, white; antennæ nearly as long as the body, black, the 8th to 13th joints white. Thorax: mesothorax and pectus black, densely and deeply punctured, the dorsal lines deeply impressed; the collar above, tegulæ, a broad sutural line before and a short line beneath the wings, and an oblique line on each side of the pectus, white; pleura yellowish-rufous; scutellum, subconvex, shining, black, its lateral margins and the carina on each side which connects it with the mesothorax, white, having the appearance of a V; postscutellum also black, with a white spot beneath the scutellum; metathorax densely punctured, slightly pubescent, shining, entirely yellowish-rufous, rather abruptly truncate behind, the elevated lines indistinct, the lateral tubercles small and acute or subacute. Wings hyaline; nervures and stigma black, the latter with a pale spot at base; areolet very minute, quadrate. Legs yellowish-rufous, the four anterior coxæ whitish, the posterior tibiæ sometimes obfuscated, their tarsi yellowish. Abdomen elongate, subovate, shining, yellowish-rufous; basal segment polished, the apical third quadrate; sometimes the terminal segment is tinged with yellow; ovipositor as long as the abdomen, rufo-piceous, valves black. Length 4—5½ lines; expanse of wings 6½—8 lines.

Male.—Resembles the female, but is more slender, the antennæ are rather longer than the body, the annulus distinct above, but indistinctly defined beneath and yellowish; the face is entirely white; the space between the anterior and middle coxæ is also white; the extreme base of the metathorax is blackish; the four anterior coxæ and trochanters are white, as well as the posterior tarsi, except extreme base and apex which are black; the extreme tips of the posterior femora and most of their tibiæ also black, and the apical segments of the abdomen are sometimes obfuscated, probably from discoloration. Length 4 lines; expanse of wings 7 lines.

Hab.—N. Y. (Grote); Penn. (Cresson); Delaware (Dr. Wilson).

This species is easily distinguished by its pale rufous color, with the head and mesothorax black variegated with white lines.

4. **Mesostenus gracilis**, n. sp.

Pale yellowish-rufous; head, antennæ and mesothorax black, varied with white; wings subhyaline, iridescent; metathorax unarmed.

Male.—Pale yellowish-rufous, slender, shining; head black; the orbits, interrupted behind, a large spot on the face confluent with the orbits, clypeus, most of mandibles, and the palpi, white; antennæ long, porrect, entirely black. Thorax shining; mesothorax black, the dorsal lines deeply impressed; pectus also black; tegulæ, a sutural line before and a short line beneath the wings, and a line on the collar extending down on each side of pectus, white; anterior part of the pleura stained with blackish and having an obscure whitish spot on each side between the anterior and middle coxæ; scutellum and postscutellum black, polished, the former with its tip and lateral margins narrow white, extending forward upon the lateral carinæ, in the shape of a V; metathorax yellowish-rufous, its base blackish, the elevated lines not well defined, the lateral tubercles wanting. Wings subhyaline, slightly stained with fuscous, iridescent; nervures and stigma fuscous; areolet minute, quadrate. Legs slender, yellowish-rufous, the four anterior coxæ and trochanters white beneath, black above, as well as the posterior trochanters above; posterior tibiæ and tarsi more or less obfuscated. Abdomen elongate and slender, subcylindric, shining; basal segment linear; apical segments polished, slightly obfuscated. Length 3¼ lines; expanse of wings 5 lines.

Hab.—Virginia. Dr. Thomas B. Wilson.

Closely allied to *M. thoracicus*, but is much smaller and slenderer, the antennæ are entirely black and the posterior legs are differently colored.

5. **Mesostenus? fulvus**, n. sp.

Fulvous; head black, the face and orbits, white; antennæ black with a white annulus; wings hyaline; posterior tarsi white.

Male.—Fulvous, shining; head black, the face, orbits very broad on the cheeks, clypeus, mandibles and palpi, white; antennæ rather longer than the body, porrect, black, the 11th to 13th or 14th joints white, the basal joint beneath with a white spot. Thorax opaque above, the dorsal lines very deeply impressed and black; tegulæ, a sutural line before and a short line beneath the anterior wings, line on the collar extending down its sides, a line on the pleura in front and a spot before the middle coxæ, white; scutellum slightly convex, fulvous, the lateral carinæ in front white, the space on each side blackish; postscutellum with a fulvous transverse spot; metathorax fulvous, blackish at extreme base, the posterior face tinged with whitish, the elevated lines sharply defined, the lateral tubercles strongly developed, rather obtuse and white. Wings hyaline, iridescent; nervures and stigma blackish-fuscous, the latter with a longitudinal, fulvous line through the center; areolet small, quadrate, the outer nervure indistinct or wanting. Legs fulvous, the four anterior pair yellow in front, the posterior pair very long, somewhat tinged with brown; the four anterior coxæ and trochanters, and the 2nd, 3rd and 4th joints of the posterior tarsi, pure white. Abdomen rather short; a little longer than the head and thorax, subovate, shining, reddish-fulvous; basal segment about as long as the second, apical half broad, convex, petiole short, stout, flattened;

apical segments sometimes tinged with yellowish. Length 3—3½ lines; expanse of wings 6—6½ lines.

Hab.—Illinois. Dr. Samuel Lewis.

This species may not belong to this genus on account of the areolet of the superior wings being incomplete.

Genus RHYSSA, Grav.

1. **Rhyssa Nortoni**, n. sp.

Black, varied with ferruginous and spotted with yellow; antennæ black; legs mostly yellow; wings subhyaline.

Female.—Head black; the cheeks and broad frontal orbits, bright yellow, the latter emarginate on each side of the insertion of the antennæ; mandibles black, shining; palpi testaceous; antennæ more than half the length of the body, black, apical joint tinged with rufous. Thorax sculptured like that of *R. lunator* Fabr., black; the mesothorax dull rufous, with the incisures and a line down the middle, blackish; on each side of the collar a large, concave, smooth, polished space, margined above with dull rufous and posteriorly with black; an oval elevated spot on each side beneath the insertion of the anterior wings, the scutellum and postscutellum, bright yellow; metathorax smooth and shining, pale ferruginous above, with the extreme posterior margin and two large spots on each side, bright yellow; tegulæ pale. Wings hyaline, tinged with yellowish, and having a violet reflection in certain lights; stigma dull rufous, nervures black; areolet shaped like that of *lunator*, and connects at its apex with the second recurrent nervure. Legs bright yellow, varied with honey-yellow; coxæ black, the anterior pair brown-black with a small yellowish spot in front; middle and posterior femora obfuscated, their tips bright yellow, their tibiæ honey-yellow; tarsal claws blackish at tips. Abdomen brown above, the basal segment pale ferruginous; on each side of the 2nd and following segments, anteriorly, a rather large ferruginous stain, which becomes confluent on the disk of the 2nd and 3rd segments; a semicircular spot on the apex of the 1st and 2nd segments, a large rounded spot on each side of the three following segments, and a transverse spot on each side of the two apical segments, all bright yellow; ventral segments yellowish-ferruginous, their apical margins bright yellow; ovipositor nearly twice the length of the body, brown-black, polished, valves brown-black, the grooves white, more distinctly so at tip. Length 13 lines; of ovipositor 25 lines; expanse of wings 22 lines.

Hab.—Rocky Mountains, Colorado Territory.

It gives me pleasure to dedicate this most elegant species to Mr. Edward Norton, the distinguished American hymenopterist.

2. **Rhyssa albomaculata**, n. sp.

Black; antennæ with a broad white annulus; thorax and abdomen spotted with white; legs pale fulvous; wings hyaline.

Female.—Black, shining; the orbits white; antennæ three-fourths the length of the body, black, with a broad white annulus near the tip. Thorax gibbous, the mesothorax transversely rugose, the pleura smooth and polished; a broad line on each side just beneath the mesothorax, a transverse mark on each side of the collar, the tegulæ, a spot beneath the wings, and an elongate, slightly oblique mark above and a little before the middle coxæ, all white; scutellum black, its apical half white, slightly emarginate before, also a small transverse white spot behind; metathorax rather smooth at base, transversely aciculate at apex, on each side behind a large white spot, and just beneath a smaller white spot. Wings hyaline, the nervures black, pale at base, stigma also black, with a pale spot at base; areolet minute, petiolated. Legs pale fulvous, the four anterior coxæ with a lateral white spot, the middle ones elongate; posterior coxæ with a white spot at base above; tips of the posterior tibiæ and of all the tarsi, dusky. Abdomen black, shining; the two basal segments with an angular white mark on each side at tip; the four following segments with two spots on each side, the extreme lateral ones longitudinal and pointed before; on each side of the 7th segment a broad, oblique, white stripe; ovipositor longer than the body, piceous, the valves black, their extreme tips within, white. Length 11½ lines; of ovipositor 13½ lines; expanse of wings 17 lines.

Hab.—New Jersey. E. T. Cresson.

Very similar to *R. persuasoria* Linn., formerly known only as a European species, but of which I have a ♀ and 2 ♂ specimens from the Rocky Mountains, precisely identical with European specimens with which I have carefully compared them, both ♂ and ♀. The ♀ of *R. persuasoria* differs from the ♀ *albomaculata*, above described, as follows: The antennæ are entirely black, the spots on the pleura are much reduced; scutellum with a large subtriangular, white spot at tip; the upper spot on each side of the metathorax is much smaller than the lower one; the wings are slightly iridescent, the areolet much larger, more oblique, and scarcely petiolated; the legs are dark fulvous, the posterior tibiæ and tarsi blackish, the posterior coxæ immaculate, the anterior trochanters are white in front; the abdomen is marked the same, except that the spots on the 7th segment are situated as on the preceding segments.

3. **Rhyssa nitida**, n. sp.

Black; face and frontal orbits white; legs pale fulvous, varied with white and dusky: wings hyaline, iridescent.

Male.—Black, polished; face beneath the antennæ, the frontal orbits not quite reaching the summit of the eyes, and the palpi, white; antennæ two-thirds the length of the body, piceous, paler towards the apex. Thorax: mesothorax coarsely and transversely rugose; pleura and metathorax polished, slightly pubescent; scutellum transversely aciculate. Wings hyaline, iridescent; nervures and stigma fuscous, the former pale at base and the latter with a pale spot at base; areolet minute, oblique and petiolated. Legs pale fulvous; the anterior coxæ and trochanters entirely, the anterior femora in front, their base and apex behind, their tibiæ and tarsi, the middle trochanters, tips of their femora, their tibiæ within, and the basal two-thirds of the posterior tibiæ within, all white; the middle tarsi, tips of the posterior femora, their tibiæ at tips and without, and their tarsi, dusky. Abdomen twice as long as the head and thorax, slender, polished, immaculate above; beneath, the incisures are narrowly whitish. Length 7 lines; expanse of wings 9 lines.

Hab.—Virginia. Dr. T. B. Wilson.

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Descriptions of North American LEPIDOPTERA, No. 4.

BY AUG. R. GROTE,
Curator of Entomology, Buffalo Society of Natural Sciences.

NOTODONTINA, H-S.

Genus PARATHYRIS, Hübner.

Parathyris Angelica, nov. sp. (Plate 4, fig. 1. ♀.)

Anterior wings truncate at the apex, excavate along external margin, pale soft steel-grey, with approximate median bands and two vitreous spots between veins 4 and 6 (m.) in the terminal space. Basal lines obsolete, the spaces evenly greyish slightly sprinkled with minute brownish dots; median space similarly colored, median bands very approximate, diffuse, dark brownish, the transverse anterior nearly straight, preceded by a wavy, sub-obsolete, shade line, the transverse posterior arcuated at the disc, slightly undulate; discal spot minute. Subterminal and terminal spaces darker shaded, subterminal band diffuse, indistinct, bordering two moderate vitreous spots which are margined externally with brownish, situate in the interspaces between veins 4 and 6 (m.), the upper one the larger, quadrate with irregular margins, the lower triangular; fringes brown. Posterior wings entirely pale brown with two darker median bands, the inner diffuse, broad, dark brown, corresponding to the transverse posterior band of the anterior wings, the outer narrow, slightly undulate, margined outwardly by a distinct pale shade; external border shaded with greyish; fringes brown. Under surface of both wings greyish, shaded with pale brownish at base, with a brown band corresponding to the transverse posterior band of the upper surface of anterior, and inner band of posterior, wings. Thorax and tegulæ similarly colored with anterior wings, with a brownish central crest, tegulæ with a brown line; abdomen pale brown, resembling the posterior wings in coloration, greyish underneath, minutely sprinkled with brown, with two lateral white spots on first and second segments; head and palpi of a very pale brown shade; antennæ short, pectinate, testaceous; legs clothed with greyish hairs, sprinkled with brownish, all the tibiæ furnished with lateral tufts of long greyish hair tipped with brown. ♀ Exp. 1.08 inches.

Hab. Middle States. (Coll. Ent. Soc. Phil.)

Congeneric with *Parathyris torrefacta*, A. & S., and the second described North American species of the genus.

A single ♀ specimen in good preservation kindly collected for me by Mrs. S. A. Darrach, at Coldenham, Orange Co., N. Y.

Genus **HETEROCAMPA**, Doubleday.

Heterocampa leptinoides, nov. sp. (Plate 4, fig. 2. ♀.)

Anterior wings dark cinereous, all the lines obsolete, a basal parallel black line, terminal spaces light grey. From the base of the wing a narrow distinct black streak runs parallel with the costa, below the median vein to median space, which latter is faintly greyish from along the costa to median vein. The transverse anterior lines are hardly visible, acutely dentate; discal spot black, moderate; veins in the terminal half of the wing marked with black interrupted with grey; transverse posterior lines indistinct, dentate. Subterminal space showing a brownish shade, blackish outwardly superiorily, with black cuneiform marks between the veins. Terminal space showing a light grey shade, broadest at apex. Posterior wings dark cinereous, immaculate. Under surface of both wings blackish cinereous, except in the terminal spaces which are light grey on both pair. Thorax, legs and abdomen cinereous, latter paler; tarsi annulated. ♀ Exp. 1.07 inches.

Hab. Middle States. (Coll. Ent. Soc. Phil.)

A similarity of ornamentation to the Cymatophorid genus *Leptina* induces the specific name. This species was collected for me by a kind friend in the same locality with the preceding.

Genus **NOTODONTA**, Ochs.

Notodonta stragula, Grote.

A ♀ specimen, taken in Orange County, N. Y., now in the extensive collection of Stephen Calverley, Esq. of Brooklyn, L. I., does not differ from the ♂, except in the darker, more evenly colored secondaries.

ARCTIOIDEA, H-S.

Genus **ARCTIA**, Schk.

Arctia Saundersii, Grote. (Plate 4, fig. 3. ♂.)

Arctia Saundersii, Grote, Proc. Ent. Soc. Phil., Vol. 3, p. 75. ♂.

Arctia virgincula, Saunders, Syn. Can. Arct. p. 9.

I have five male and two female specimens before me, kindly sent me by Mr. Wm. Saunders. The ♀ merely differs from the ♂ by the paler antennæ and narrower bands on the anterior wings. I refer the student to Mr. Saunders' paper for the description of several slight varieties of this species. Exp. 1.05 to 1.08 inches.

Hab. Canada West. (Coll. Ent. Soc. Phil.)

Until Kirby in 1837 described, without figuring, his *Callimorpha parthenice*, no second species nearly allied in coloration and ornamentation to *Arctia virgo* Linn. had been suspected by authors. Since Kirby wrote, this species has been sought for by Entomologists in a form of *A. virgo*, in which the series of spots on the posterior wings show a difference of size or position. I have elsewhere stated that I consider *A. parthenice* of authors as identical with *A. virgo* Linn., and since rearing imagos of both sexes from larvæ kindly sent me by Mr. Wm. Saunders as the larvæ of *A. parthenice*, I see no reason for altering my opinion. While I have little hesitation in referring *Arctia parthenice* of Messrs. Saunders and Packard to *A. virgo* Linn., I am not so certain that Kirby's *C. parthenice* should be similarly referred. This author's description of the anterior wings equally applies to *A. virgo* Linn. with *A. Saundersii* Grote, and it is on the anterior wings more especially that I have seized upon a character which I believe is specific and will readily distinguish the latter species, viz: the linearity of the stripes on the veins. Kirby's description of the posterior wings, as well perhaps as the given expanse, would indicate *A. Saundersii* as the species intended, for in all my specimens the discal spots are absent and there are but five terminal spots, the expanse being 1½ to 1¾ inches, Kirby giving the latter measurement, while the discal spots are always present in my specimens of *A. virgo* Linn., and but very few expand less than 2 inches.

While, therefore, there is a probability that *A. Saundersii* was the species intended by Kirby, the unsatisfactory diagnosis, which contains no comparative allusion to Linnæus' species, renders it a matter of uncertainty, and I prefer to refer Kirby's description to *A. virgo* L., and to retain the name, under which I have described it, for the second smaller species. I find that it is a sexual distinction of the males of *A. virgo* L. and *A. Saundersii* Grote, that the antennæ are lighter colored and the bands on the anterior wings broader. I give the following description and synonymy of *A. virgo* L., figuring the ordinary male of the species:—

Aretia virgo, Linn. (Plate 4, fig. 4. ♂.)

Arctia virgo Linn. Syst. Nat. 501. Abb. & Smith, Ins. Ga. p. 123, t. 62. Hübn. Exot. Sch. ii, Taf. 189. Harr. Cat. Ins. Mass. p. 73. Duncan, Nat. Libr. xxxvi. Pl. 19. Harr. Rt. Ins. Mass. p. 241. Walk. C. B. M. iii, p. 608. Clem. Proc. A. N. S. Phil. 1860, p. 528. Morris, Syn. Lep. N. A. p. 338. Saunders. Syn. Can. Arct. p. 6. Packard, Syn. U. S. Bombycidæ, Proc. Ent. Soc. Phil. Vol. 3, p. 115.

Arctia parthenice, Morris, Syn. Lep. N. Am. p. 339. Saunders, Syn. Can. Arct. p. 5. Packard, Syn. U. S. Bombycidæ, Proc. Ent. Soc. Phil. Vol. 3, p. 116, 1864.

Callimorpha parthenice Kirby, Fauna Am.-Bor. IV. p. 204 ? var? *virgo,* Walk. C. B. M. iii, p. 608.

Anterior wings deep velvety black, all the veins diffusely striped with flesh color. From the base of the wing, below median vein, a broad flesh-colored band runs to external margin, becoming distinctly furcate above internal angle, and upon which, in the terminal half of the wing, rests a series of identically colored bands resembling the letter K with the straight stroke turned towards the base of the wing and bent, and the upper limb attaining the external margin below the apex, reflexed to costa; a straight broad stripe crosses the disc from costa to median vein, sometimes apparent in the interspace below the latter. Posterior wings red of a more or less pinkish shade, with a terminal series of black spots margined with buff, becoming fused at costal angle, the one above anal angle of uncertain size in either sex, discal and subcostal spots usually present, besides which along costal margin in some specimens of either sex are black shade streaks, terminating in one or two accessory spots. Tegulæ and thorax black margined with flesh color, two black spots on prothorax making five thoracic black maculations. Head, above the eyes, flesh color, immaculate; palpi, under surface of thorax and legs, smoky black, latter touched with yellowish on anterior femora and tibiæ in the ♂, posterior tibiæ generally streaked with whitish in either sex; under surface of abdomen black, marked with whitish at the base of the segments in the ♂. Antennæ pectinate, smoky brown in the ♂, darker, simple in the female. Exp. 1.08 to 2.05 inches. (Coll. Ent. Soc. Phil.)

Hub. Both Canadas, and occurring throughout the Eastern, Western and Southern States.

The coloration of the stripes on anterior wings is subject to variation from pale flesh color to yellowish. I have seen very large specimens of this species expanding upwards of 3 inches and in which the spots on the posterior wings were largely developed, but I cannot separate them specifically and feel confident that, notwithstanding the individual variation in the number and size of the black spots on the posterior wings, there is but one species to be considered. The larva, like most of its family associates, is essentially polyphagous and feeds readily on a variety of herbs as *Chenopodium album*, *Simplocarpus fœtidus*, etc. I regard it as subject to considerable variation of coloration and perhaps of ornamentation, which would satisfactorily account for discordant diagnoses.

NOCTUINA, H-S.

Gen. **CATOCALA**, Ochs.

Catocala subnata, nov. sp. (Plate 4, fig. 5. ♂.)

♂. Anterior wings greyish, faintly shaded with pale greenish; transverse posterior line acutely dentate, enclosing the subreniform spot. Basal half-line distinct; sub-basal space large; transverse anterior line broadly marked at costa, oblique, without prominent angles, wavy, dark brownish with an anterior whitish shade line till below the median vein, thence to internal margin whitish; sub-costal tooth sub-obsolete. Reniform spot moderate, with a broad anterior whitish costal shade, brown with a whitish external ringlet and darker encircling line; subreniform large, whitish, excavated posteriorly, surrounded by the transverse posterior line, concolorous. Transverse posterior line dark brownish, broadly marked at last inflexion thence, to internal margin, whitish, the two prominent teeth large, sub-equal, very acute, all the dentations acute and distinct. Subterminal space pale brownish, subterminal line whitish, dentate, diffuse; terminal series of spots between the veins reduced. Posterior wings dusky yellow; median band black, wide, but slightly constricted on the disc, terminating obtusely much before internal margin. Terminal band black, constricted just before anal angle; fringes pale yellowish. Under surface pale yellowish, with scattered punctations and iridescent in terminal spaces; anterior wings crossed by three, posterior wings by two transverse black irregular bands. Thorax greyish mixed with brownish, with prothoracic brown lines; abdomen luteous. ♂. Exp. 3.06 inches.

Hab. Maryland. (Coll. Ent. Soc. Phil.)

Closely allied to *C. neogama* A. & S.; the expanse is greater and the body appears proportionally slenderer; the subreniform spot is surrounded by the t. p. line and excavated posteriorly; the t. p. line is acutely dentate, the two prominent teeth much larger and very acute, the dark spots in the terminal interspaces are more reduced; the yellow of the posterior wings is paler and the median band wider, less constricted on the disc and terminating obtusely before internal margin; the general coloration of anterior wings is much the same as in *C. neogama*. From *C. piatrix* Grote, *C. palæogama* Guenée, and *C. phalanga* Grote, its next nearest allies, the present species is sufficiently distinct as to render detailed comparisons unnecessary.

STATED MEETING, OCTOBER 10.

President BLAND in the Chair.

The following Papers were presented for publication:—

"List of Diurnal Lepidoptera found in the vicinity of Cleveland, Ohio, by John Kirkpatrick."

"Synopsis of the Bombycidæ of the United States, Part 2, by A. S. Packard, Jr., M. D."

"On Phytophagic varieties and Phytoghagic species, by Benj. D. Walsh, M. A."

"On the insects, Dipterous, Coleopterous and Lepidopterous, inhabiting the galls of certain species of Willow, by Benj. D. Walsh, M. A."

"Description of the female of Argynnis Diana, by Wm. H. Edwards."

"Notes on the Argynnides of California, by Wm. H. Edwards."

"Descriptions of two new genera of North American Ichneumonidæ, by E. T. Cresson."

On ballot, Mr. John Kirkpatrick, of Cleveland, Ohio, and Mr. Julius Meyer, of Brooklyn, L. I., were elected *Corresponding Members*.

STATED MEETING, NOVEMBER 14.

President BLAND in the Chair.

The following papers were presented for publication:—

"Descriptions of North American Lepidoptera, No. 5, by Aug. R. Grote."

"Notes upon Exotic Lepidoptera, chiefly from the Philippine Islands, with descriptions of some new species, by Tryon Reakirt."

"North American Micro-Lepidoptera, by B. Clemens, M. D."

"Notes on some Sphingidæ, with descriptions of their Larvæ and Pupæ, by J. A. Lintner."

"Descriptions of several new species of Cynips, and a new species of Diastrophus, by H. F. Bassett."

"Notes on the Synonymy of certain species of North American Lepidoptera, by Aug. R. Grote."

"On the Hymenoptera of Cuba, by E. T. Cresson."

"Descriptions of new species of Cuban Lepidoptera, by C. A. Blake."

"Descriptions of two new species of Masaris, by E. T. Cresson."

"Catalogue of Cuban Coleoptera, in the Collection of the Entomological Society of Philadelphia, by Jas. H. B. Bland."

"Notes on Cuban Sphingidæ, in the Collection of the Entomological Society of Philadelphia, by Aug. R. Grote."

And were referred to Committees.

On ballot, Mr. Rufus Bucknel of Philad. was elected a *Resident Member*, and Prof. J. O. Westwood of England, Messrs. Jas. Angus of West Farms, N. Y., and Charles Sonne of Chicago, Ill., were elected *Corresponding Members*.

* * *

List of DIURNAL LEPIDOPTERA found in the Vicinity of Cleveland, Ohio.

BY JOHN KIRKPATRICK.

Papilio turnus, Linn. Common. The dark variety does not occur.

Papilio troilus, Linn. Common latter part of summer.

Papilio asterias, Fab. Very plentiful some seasons, always common.

Papilio philenor, Fab. Common latter part of summer.

Papilio cresphontes, Cram. Rare; four specimens only are known to have been taken here.

Papilio ajax, Sm. & Abb. Common where pawpaw bushes are.

Papilio marcellus, Cram. More numerous than the preceding in same localities.

Pieris protodice, Boisd. Very plentiful, especially in the fall, and evidently increasing.

Colias philodice, Godt. Very abundant. Some of the females are very pale, almost white. This fall a variety is common that differs considerably from the usual one. Both sexes are nearly alike; the female being the larger and rather paler than the male; both are sulphur-yellow above; the black border rather wider in the female, without yellow spots, but is powdered with minute yellow specks. The rosy fringe in both sexes is wanting.

Danais archippus, S. & A. Throughout the summer and fall this is our most common species, owing to the abundance of its food-plant. The larva seems to feed indiscriminately on all our species of Asclepias.

Argynnis cybele, Godt. Very common; but until recently has been confounded with *Aphrodite*. Our species agrees exactly with figure in Boisduval & Leconte's work.

Argynnis Aphrodite, Fab. Found occasionally, but less seldom than the preceding species.

Argynnis columbina, Godt. Very rare; but one specimen known to have been captured.

Argynnis bellona, Godt. Common latter part of summer.

Terias lisa, Boisd. Rare; has been taken; I do not possess a specimen.

Melitæa tharos, Cram. Very common.

Vanessa J-Album, Boisd. Not common.

Vanessa progne, Cram. Occasionally found.

Vanessa antiopa, Linn. Very common all the season; this year rarer than usual.

Vanessa Milberti, Godt. Seldom seen.

Grapta interrogationis, Fab. One of our most common species.

Grapta comma, Harris. Common.

Pyrameis atalanta, Linn. Usually quite common, but have not seen a specimen this season.

Pyrameis cardui, Linn. In some seasons plentiful, in others rare.

Pyrameis huntera, Sm. & Abb. More aboundant, and occurs more regularly than *cardui*.

Nymphalis dissippus, Godt. Common in the fall.

Nymphalis ursula, Fab. Rather rare, although occasionally found in a few localities.

Neonympha eurythris, Fab. Never numerous, but occasionally found in grain fields.

Neonympha canthus, Linn. Rare.

Argus pseudargiolus, Boisd & Lec. Common.

Polyommatus comyntas, Godt. Not uncommon.

Polyommatus thoe, Boisd & Lec. A very common species.

Polyommatus americana, Harris. A common species at the end of August and during September. Often confounded with the female of *thoe*; and although on the upper side there is considerable resemblance, beneath there is a great difference. *Americana* has the primaries beneath of a bright coppery-red with a tawny border answering to the black above, with *nine* black spots edged with tawny opposite the *eight* above, except the ninth, which has no corresponding one on the upper side, and is situated close to the shoulder; on the inner part of the tawny border there is a partial black band. The secondaries are tawny beneath with about fifteen black dots, and a serrated, narrow coppery band, beginning at the inner angle and extending two-thirds across; fringe tawny with no black spots or markings. It is always a smaller species than *thoe*.

Polyommatus epixanthe, Boisd. Not plentiful.

Thecla favonius, Godt. Rare.

Thecla humuli, Harris. More common. Specimens of both the above species are in the collection of Prof. Kirtland of this place, and were identified by the late Dr. Harris.

Hesperia huron, Edwards. Common.

Hesperia uncas, Edwards. I have a single ♀ specimen, caught in the neighborhood by myself.

Hesperia bathyllus, S. & A. Occurs at Rockport, 4 miles from here.

Nisoniades juvenalis, Sm. & Abb. Common in some localities.

Nisoniades catullus, Godt. Found at Rockport.

Goniloba tityrus, Fab. Common every year.

Pamphila bulenta, Boisd. Found at Rockport.

Pamphila Peckii, Kirby. Found at Rockport.

There is no doubt but additions to this list may yet be made, especially in *Hesperia* and the other smaller butterflies. Until recently it was very difficult for us here to identify a specimen of the more obscure species, when caught.

Synopsis of the BOMBYCIDÆ of the United States.

BY A. S. PACKARD, JR., M. D.

PART II.

Subfamily DASYCHIRÆ Hübner.

Following the law of priority the usual name *Liparidæ* Boisd. must be dropped for Hübner's term *Dasychiræ*. This is group "D" "Larræ Fasciculatæ" of Denis and Schiffermiller (W. V.). In 1816 it was clearly circumscribed by Hübner in the "Verzeichniss bekannter Schmetterlinge" forming "Strips II *Hypogymniæ*, Strips III *Leucomæ* and Strips IV *Dasychiræ*" of his second "Tribus." As thus limited by this author we find the group a perfectly natural one, no genera belonging to the neighboring groups being found in it. We have selected the name of the last strips for the subfamily name, since it contains the more typical genera.

ORGYIA Ochsenheimer.

Orgyia nora Fitch.

Orgyia antiqua? Harris, Cat. Ins. Mass. p. 73. (1835).
Morris, Synopsis Lep. N. Amer. p. 249. (1862).
Rt. Ins. Mass. p. 263. (1841).
Orgyia nora Fitch, Eighth Report on Noxious Insects of N. York, p. 675. (1864).

On comparing the males of this species with two specimens of *O. antiqua* received from Professor Zeller of Meseritz, Prussia, I find that, as Dr. Fitch remarks, our species is slightly darker both above and on the under side of the body than its European representative. This species has occurred to me abundantly at Brunswick, Me., where I have never taken *O. leucostigma*, but simply seen it on the wing, Oct. 5. It flies in the hot sunshine early in September. Mr. Sanborn has given me a specimen less than half the usual size. Norway, Me., Smith (Mus. Comp. Zool.). Medford, Mass. (Trouvelot). Brookline (Shurtleff).

Orgyia leucostigma Harris.

Phalæna leucostigma Smith, Nat. Hist. Lep. Ins. Ga., p. 157. Tab. 79. (1797).
Orgyia leucostigma Harris, Report Ins. Mass. p. 262. (1841).
Walk, List Lep. Br. Mus. Pt. IV. p. 786. (1855).
Fitch, Third Report Nox. Ins. N. York, pp. 338, 364. (1856).
Morris, Synopsis Lep. N. Amer. p. 249. (1862).

Medford, Mass. (Trouvelot). Boston, (Sanborn, Shurtleff). Norway, Me., (Smith, M. C. Z.). Brunswick, Me. Flying Oct. 5.

Orgyia definita, n. sp.

Umber brown. Head, thorax, base and inner margin of primaries more testaceous. A faint basal dark straight transverse line. Beyond and near the linear lunate discal spot which is surrounded by the testaceous brown, is an indistinct nearly straight line. An outer very distinct curved line, being straight from the costa to where it is angulated on the 5th subcostal nervule, and again half way between the discal spot and internal margin. Beyond this line on the costa is an oblong dark well defined spot succeeded by a submarginal row of dots, ending in a white spot near the internal margin.

Beneath lighter. Lines faintly seen beneath, the outer one extending faintly on to the secondaries, which have a discal dot.

The markings are much more distinct in this species than in *O. leucostigma*, while the outer line is angulated nearer the middle.

Length of body ♀, .60; exp. wings, 1.20 inch.

Boston, (Sanborn).

Orgyia vetusta Boisd.

Orgyia vetusta Boisd., Lep. Cal. (Ann. Ent. Soc. France), p. 49. (1852.)
Walk., List Lep. Br. Mus. Pt. IV. p. 786. (1855).
Morris, Synopsis Lep. N. Amer. p. 250. (1862).

California, (Boisd.).

PARORGYIA nov. gen.

Body stout. Head broad and square in front. Antennæ and palpi much as in Orgyia. The thorax is provided with a median tuft of metallic scales. The fore wings of the male are shorter than the body; costa a little bent at the outer third; outer margin hardly oblique, convex, base of the wing broader than in Orgyia. In ♀ the wing is much more pointed at the apex, and the outer margin is much more oblique. The secondaries in both sexes are more rounded at the apex than in Orgyia. Abdomen tipped with a spreading tuft; on the second and third rings a tuft of metallic scales.

This genus more closely resembles Orgyia than the European Dasychira, of which *D. pudibunda* is the type. Much larger than Orgyia, the palpi are shorter, more drooping, the antennæ are provided with shorter pectinations, and the primaries have the costa straighter in the middle and towards the base, while it is more convex towards the apex, and the outer edge of the wing is less oblique.

The females are colored like the males, but the wings are larger.

Parorgyia achatina Hübner.

Phalæna achatina Smith, Nat. Hist. Lep. Ins. Ga. p. 153. Tab. 77. (1797).
Dasychira achatina Hübn., Samml. Exot. Schm. Bd. 1. Pl. 178, fig. 1—4. (1806).
Verz. (1816).
Walk. List. Lep. Ins. Br. Mus. Pt. IV. p. 865. (1855).
Morris, Synopsis Lep. N. Amer. p. 257. (1862).

♂. Cinereous fuscous with olive green scales. Base of primaries fuscous, ashen along the costa. An inner broadly dentate straight dark transverse line. A linear discoidal spot. An outer waved dark line goes parallel with the outer margin, bordered externally with fuscous. Abdomen and wings beneath lighter umber brown. Discal spot distinct on both wings, with a common rather broad line.

♀ much larger, and all the markings are plainer.

Length of body, ♂ .60, ♀ .80; exp. wings ♂ 1.20, ♀ 2.00 inches.

"July 23—Aug. 10, Cambridge" (Harris). (Harr. Col.).

Parorgyia leucophæa.

Phalæna leucophæa Smith, Nat. Hist. Ins. Ga. p. 155. Tab. 78. (1797).

Georgia (Abbot.)

Parorgyia basiflava, n. sp.

♂. Head and prothorax lighter than the rest of the thorax. Base of the primaries within the basal line yellow. Costa above this yellow spot darker than the rest of the wing, which is cinereous, without any green olive scales. Basal line straight between the median and internal nervure. The outer line approaches the inner on the internal margin. A large orbicular discal circle.

Beneath lighter, with an obscure common broad diffused line and a discoidal dot on each wing, much larger on the primaries.

Length of body .70; exp. wings 1.42 inch.

"Nonantum," (Harris). (Coll. Harr.).

LAGOA Harris.

This is a very stout bodied genus, with small and short wings. The front of the head is broadly triangular; the antennæ, which are two-thirds as long as the fore wings, are deeply pectinated to the tip, and the ♂ pectinations are as long as the front of the head is broad, well scaled and their tips are incurved, while the ♀ pectinations are short but distinct. Palpi concealed in the long wool of the front, slender, and not reaching to the front. The thorax is thickly pilose, stout, but no broader than the short and broad abdomen.

Primaries a little shorter than the body, two-thirds as broad as long; costa straight, very slightly concave, but rounded at the apex; outer margin oblique, regularly convex; internal angle rounded. In the ♀ the wing is more produced towards the apex, the outer margin being longer. Subcostal nervure goes straight to the apex, throwing off the 1st, 2nd and 3rd subcostal nervules at nearly equal distances upon the costa. Median nervules much as in Orgyia.

Secondaries do not reach to the tip of the abdomen; suborbicular, being regularly rounded from the costa around to the internal margin, though the apex is slightly produced. Median nervure curved where it throws off its nervules. A nervule divides the discoidal area. Legs slender, very pilose, with distinct pencils of hair on the lobes of the tarsal joints. At rest the wings are folded at right angles over the abdomen.

This interesting genus approaches very closely the genus Euclea in the next subfamily, and connects that group with the more typical genera Orgyia and Euproctis. Resembling Euclea in that the 4th subcostal is continuous with its nervure, while the 5th is far removed from it, in the antennæ, the head characters generally and its light color we find reasons for its present location. When we observe the larva we would easily mistake it for a hairy Limacodes larva, for like them the head is retracted, the body is short, and the legs are so rudimentary as to impart a gliding motion to the caterpillar when it moves. But since it is not apodous, and is somewhat elongated, and densely pilose with short pencils of hairs; while the pupa is also elongated and protected in an oval cocoon composed of hairs and silk, whereas those of the next subfamily are nearly spherical, we are led to consider it with Dr. Harris as belonging to the present group.

Lagoa pyxidifera.

Phalæna pyxidifera Smith, Nat. Hist. Lep. Ins. Ga. p. 107. Tab. 54. (1797).

"Georgia" (Abbot.).

Lagoa opercularis.

Phalæna opercularis Smith, Nat. Hist. Lep. Ins. Ga. p. 105. Tab. 53. (1797).
Not *Lagoa opercularis* Harr., Walk.

♀. Tawny yellow, thorax paler behind. Basal two-thirds of costa dark, below deeper tawny, covered with wrinkled white hairs. Tibiæ provided externally with long white hairs, while the denser tarsal hairs are mostly black. Abdomen with rather long dense evenly cut coarse hairs forming a short broad anal tuft.

Length of body .65; exp. wings 1.90 inch.

Beaufort, N. C., Dr. Kneeland. (Coll. Boston Soc. Nat. Hist.).

Lagoa crispata n. sp.

Lagoa opercularis Harris, Report Ins. Mass. p. 265. (1841).
Trichetra opercularis Fitch, Third Rt. Nox. Ins. N. Y. p. 45. (1857).
Walk. List. Lep. Ins. Br. Mus.

Uniform pale straw yellow. Base of the head, base of the fore legs and tarsi blackish. Very woolly; on the wings the long woolly scales are arranged into transverse waved ridges, which become longitudinal along the costa. On the costa and above the median nervure the crinkled hairs are blackish mingled with paler hairs. Below the middle the wing is discolored with brown.

Length of body ♂, .56, ♀, .65; exp. wings ♂ 1.15, ♀ 1.28 inch.

Mass., June 25 to July 10. (Shurtleff).

This fine species differs from the *L. opercularis* of the Southern States with which it has been confounded, not only in its smaller size and paler colors, but the costa of the forewings is straighter, the apex is much more pointed, and the outer margin is more oblique. The secondaries are likewise more produced. The *L. opercularis* wants, moreover, the distinct brown discoloration below the black costal border.

Among thirteen specimens reared from the blackberry bush by Mr. Shurtleff, the males are more deeply colored than the other sex. The individuals varied but slightly in having the brown middle portion of the wing more or less distinctly separated from the dark costal margin.

The larvæ were found feeding upon *Rubus villosus* early in September. The following description is taken from specimens preserved in alcohol, and is deficient in the colors of the hairs. Body very short and thick, soft and fleshy. Head very retractile. The mouth-parts are somewhat produced; the labrum and maxillæ are long and large, and the lobes of the labrum are larger than usual. The epimeral ridge along the side of the body is large and prominent, and on the prothoracic ring is much elongated, while the upper fissured edge of the ring is elongated and envelops the retractile head like a hood. On the side of the body and just behind each spiracle is a naked pyriform capitate tubercle. On each side of the body are three rows of sphericle tubercles from which arise dense bunches of soft hairs, meeting over the median line of the body in a dorsal ridge. The sides are also thickly clothed with longer silky hairs, those below being stiffer and more verticillate. This arrangement of hairs gives a convex form to the upper side, while beneath the body is flattened.

There are seven pairs of abdominal or false legs which are short and thick. The first pair of thoracic or true legs are much shorter than the two succeeding pairs.

The cocoon is long cylindrical, its texture is dense, being formed of the hairs of the larva, closely woven with silk. When the pupa, which is very thin, is about to transform it escapes from the cocoon, as the cast skin is found with the tip of the abdomen remaining in the cocoon. In this respect the genus closely resembles the pupæ of the Cochlidianæ.

Dr. Fitch remarks that "Mr. Westwood's generic name, *Trichetra*, was published the year before Dr. Harris' name, *Lagoa*." p. 46. I find this entry in Agassiz's Nomenclator Zoologicus, "*Trichetra* White in Grey, Journals of two Expeditions of Discovery in Northwest and Western Australia. II. (477), 1841."

Dr. Clemens' *Pimela lanuginosa*, described from imperfect specimens, seems to be closely allied to the *L. crispata*, but additional specimens from that locality must be obtained before deciding the question of the identity of the two species.

Subfamily COCHLIDIÆ Hübner.

EUCLEA, Hübner.

Head square in front, scales long, dense. The clypeus when denuded is broad, narrowing in front. Antennæ three-fourths as long as the fore wings, pectinated on their basal half, well scaled; in ♀ entirely simple, scaled beneath. Mandibles prominent seen from above. Maxillæ nearly obsolete. Labium large, rounded anteriorly. Palpi large, porrect, extending a little beyond the front; the third joint is conical and concealed by the hairs on the tip of the middle joint.

Thorax thick and densely pilose. The primaries are a little shorter than the body, twice as long as broad. Costa rounded towards the apex; outer margin rounded, longer than the inner edge of the wing. In ♀ the costa is more rounded at the apex. Secondaries suborbicular, reaching to the tip of the abdomen. Legs large and stout, densely pilose. Abdomen short, but little longer than the head and abdomen together, the tip broadly tufted.

Euclea Monitor, n. sp.

Limacodes cippus Harris, Rt. Ins. Mass. p. 303. (1841).
Third edit. fig. 207. (1862).
Euclea cippus Walk., Cat. Lep. Br. Mus. V. (1855).
Limacodes cippus Morris, Synopsis Lep. N. Amer. p. 126. (1862).

♂. Cinnamon brown. Antennæ pale. Costa of primaries straight, apex abruptly rounded; outer margin above nearly straight, below somewhat oblique and rounded at the internal angle. Upon and behind the median nervure are two confluent green spots margined with a row of white and brown scales. Between them is a large sinus filled in with rust red. These two spots are contiguous to three subapical spots, of which the middle one is triangulàr and largest, beyond it is a rather narrow rust red discoloration. Discal dot very distinct, ovate, brown. A submarginal obscure violet transverse band curves from the basal spot around on to the costa. Fringe darker between the ends of the nervules, interlineated with testaceous. Secondaries lighter, fringe pale. Beneath much paler.

♀. Wings more pointed at the apex than in ♂. Outer margin oblique. The spots are confluent forming a much broader fascia than ♂.

Length of body, ♂, .45. ♀, .42; exp. wings ♂ .95, ♀ 1.10 inch.

"Cambr., June 15, Aug. 5" (Harris). Boston (Sanborn, Shurtleff).

We here named this species from the striking resemblance of the larva to the iron-clad war steamer "Monitor." Its form is very regularly elliptical, flattened from above, and the conspicuous brown spot represents very exactly the form and position of the "cheese box" or turret. Add to this its armor of large rough spines, and its fierce bristling aspect must be sufficiently alarming to its more lightly clad enemies. I have seen a drawing of the supposed larva of this species in the Cambridge Museum.

Cramer's *Cippus* probably belongs to a different genus from Euclea by its more elongated primaries, convex costa and slenderer body, longer antennæ and more oblique outer edge of the wing. The green spots are arranged in a nearly straight line.

From the figure of *Limacodes delphinii* in Griffith's Cuvier, our species likewise differs. I have been unable to see the original figure of Guérin.

Euclea querceti.

Limacodes querceti Herr.-Schæffer, Lep. Exot. Sp. Nov. fig. 174. (1854).

Euclea quercicola.

Limacodes quercicola H.-Sch. Lep. Exot. Sp. Nov. fig. 175. (1854).
Walk., List. Lep. Br. Mus. Pt. V. (1855).
Morris, Synopsis Lep. N. Amer. p. 126. (1862).

"Penn. Dr. Melsheimer." (Harr. Coll.)

Euclea bifida, n. sp.

♂. Form of the primaries intermediate between *E. quercicola* and *monitor*, costa being straight, apex rounded, and the outer margin oblique. A small green bifid basal patch with a sinus externally extends to the basal third of the 4th median nervule, and is lined without with white and brown scales. Beyond a bright ferruginous patch. Three subapical dots situated as usual, of which the upper one is minute, while the middle one is triangular. In one case the two lower dots are united and continued inwards along the 4th subcostal nervule. The discal brown dot is linear. Secondaries concolorous with primaries, being much darker and longer than usual, and rounded at the apex.

Length of body, ♂ .40; exp. wings .90 inch.

Brunswick, Me. August. Taken at light.

Euclea ferruginea, n. sp.

♂. More reddish than the other species. Primaries with the costa straight and the outer margin more oblique than usual. Basal green spot small, slightly indented externally. Middle subapical spot large; lower one obsolete with a few scales connecting it with the reddish discal spot which is margined above with brown. Beyond the green spots the wing is suffused with rust red, of a lighter hue than any of the other species. Outer edge darker, like the costa.

Beneath both wings are alike, almost testaceous. Fringe brown.

Length of body .45; Exp. wings 1.20 inch.

St. Catharines, C. W. (Coll. Scudder).

Euclea pænulata.

Empretia pænulata Clemens, Proc. Acad. Nat. Sc. Phil. p. 159. (May, 1860).
Morris, Synopsis Lep. N. Amer. p. 131. (1862).

New York (Edwards, Calverley). St. Louis, Mo. (Sanborn).

CALLOCHLORA nov. gen.

Head prominent, the front very broad, square. Antennæ shorter than in Euclea, pectinated on the basal half, the branches a little longer than in Euclea. The palpi are porrect, the subacute tips passing a little beyond the front, but they are not so stout or so long as in Euclea. Thorax stouter than usual, globose, while the abdomen is small, tapering rapidly towards the tip, which is not much tufted. Primaries broad, costa swollen near the base, and towards the apex, being more excavated in the middle than Euclea, while the apex is more produced, and the outer edge is longer and more oblique, more regularly rounded and continuous with the inner edge which is a little shorter than the outer edge, while in Euclea the outer edge is shorter than the inner. The subcostal nervure runs nearer the costal edge than usual, going straight to the origin of its 3rd nervule. The origin of the 1st, 2nd and 3rd s. c. nervules are equidistant. Apical interspace shorter and broader than in the preceding genus. Discal nervules, and origin of last subcostal and 1st median are all placed well beyond the middle of the wing. Last s. c. nervule arises opposite the independant or 1st median where in Euclea it is removed much farther inwards. The 2nd median nervule arises farther in than the 3rd, and the end of the nervure connecting them is very oblique, while in Euclea it is straight and the two nervules arise opposite each other.

The secondaries reach nearly to the tip as in Euclea, but are narrower, and the outer margin is shorter, thus making the interspaces narrower, especially the apical space; and the branches of the median nervure are shorter.

This genus is quite distinct from the preceding, and the single species known can be easily recognized by its grass-green thorax and the broad grass-green band that separates the brown margin of the wing from its base. The wings and body is finer scaled than in Euclea and the veins can be more distinctly seen on either side.

Callochlora vernata, n. sp.

♂. Of a uniform pale cinnamon brown. A broad, short vertical tuft between the bases of the antennæ. Thorax above grass green. Middle green band on the primaries straight on the outer edge; within it is slightly excavated, and follows the inner edge to the base of the wing. The secondaries are concolorous with the body, and above are a little paler within the outer edge.

Length of body ♂, .45; exp. wings ♂, .94 inch.

New York, (Grote). Phil., (Coll. Ent. Soc.).

NOCHELIA Clemens.

Nochelia tardigrada Clem.

Nochelia tardigrada Clem., Proc. Acad. Nat. Sc. Phil. p. 160. (May, 1860).
Morris, Synopsis Lep. N. Amer. p. 131. (1862).

EMPRETIA Clemens.

Empretia stimulea Clemens.

Empretia stimulea Clem., Proc. Acad. Nat. Sc. Phil. p. 159. (May, 1860).
Morris, Synopsis Lep. N. Amer. p. 130. (1862).

Conn. (Harr. Coll.) New York, (Grote.)

Hübner's *Streblota nesea* (Samml. Bd. 3. pl. 32.) very closely resembles our species. It is from Brazil.

PHOBETRUM Hübner.

Phobetrum pithecium.

Phalæna pithecium Smith, Nat. Hist. Lep. Ins. Ga. p. 147. Tab. 74. (1797).
Phobetion abbotana Hübn., Verz. p. 398. (1816).
Limacodes pithecium Harr., Rt. Ins. Mass. p. 304. (1841).
Ecnomidea pithecium Duncan, Nat. Libr. vol. xxxii. p. 183. fig. (1852).
Limacodes? pithecium Morris, Synopsis Lep. N. Amer. p. 127. (1862).

"Dublin, N. H.," (Harr. Coll.) Boston, (Sanborn.) Salem, (F. W. Putnam.)

Mr. Putnam has succeeded in raising this moth from larvæ found feeding on the plum.

ADONETA Clemens.

Adoneta voluta Clemens.

Adoneta voluta Clemens, Proc. Acad. Nat. Sc. Phil. p. 158. (1860).

Penn.

LIMACODES Latr.

The three species noticed below are all congeneric with the European species *L. testudo*, for a specimen of which I am indebted to Mr. A. R. Grote. I have also received this and *Heterogenea asellus* from Professor Zeller, of Meseritz.

Limacodes scapha Harr.

Limacodes scapha Harr. Rt. Ins. Mass. p. 303. (1841).
Walsh, Proc. Bost. Nat. Hist. Soc. IX. p. 298. (Feb. 1864).

Light cinnamon brown. Palpi, prothorax, femora and tibiæ and secondaries a little darker. On the primaries the costo-median region is filled in with a large dark tan colored triangular spot, its apex sometimes rounded, terminating a little beyond the submedian nervure. It is continued along the costa to the base of the wing, and terminates sharply upon the apex. Externally it is lined with silver. A discoidal dark discoloration. Beneath concolorous with the upper side of the secondaries, a little darker at the apex. The body is stouter than in the other species, while the head is hardly so prominent. The costa of the primaries, which is straight, becomes a little convex towards the apex, hence the apical interspace is a little broader and shorter than usual. The internal angle is not so well marked as in the other species.

Mr. Shurtleff has reared this species from the larva which he found under a maple tree, and has thus enabled me to identify it with Harris' species. According to his description the larva is green, spotted above with brown; pale beneath. The sides were raised and the dorsal surface flattened. It constructed a dense obtusely cylindrical ovate cocoon on the surface of the ground, Oct. 17. It was surrounded by an outer thin envelop, covered with grains of sand. The moth appeared June 15.

Limacodes biguttata n. sp.

Of a soft velvety buff-brown. A whitish line reaches from the middle of the internal margin across and outward on to the middle line. A short corresponding one from near the costa goes to the middle of the outer margin, thus making an inverted broad ⅄ (y) inclosing at the internal angle a roundish red spot. Apex red. Secondaries and beneath uniform obscure buff-brown. It is a soft, woolly, velvety species, thickly scaled, covering over the nervures.

"Penn., Nonantum," (Harr. Coll.) New York, (Edwards.)

Limacodes Y-inversa n. sp.

♀. Testaceous yellow. Primaries with brown lines reaching from the inner third of the internal margin to just beyond the middle of the costa, with a second one parallel to it, but interrupted in the middle of the wing by a third line which arises half way on the costa between the first line and the apex, thus forming an inverted capital Y. Secondaries and wings beneath hardly paler than the rest of the body.

Length of body, .40; exp. wings, 1 inch.

Penn., (Harris Coll.)

Limacodes? hyalinus Walsh.

Limacodes? hyalinus Walsh, Proc. Bost. Soc. Nat. Hist. IX. p. 299. (Feb. 1864).

Illinois.

Limacodes? tetradactylus Walsh.

Limacodes? tetradactylus Walsh (*Larva*), Proc. Bost. Soc. Nat. Hist. IX. p. 300. (Feb. 1864).

Illinois.

CYRTOSIA nov. gen.

Front of the head narrow. Palpi long, slender, slightly ascending, terminal half passing beyond the front; third joint long acute. Antennæ simple in ♂, hardly thickened at the base; in ♀ a little more slender. Thorax slender. Primaries half as broad as long; costa more convex than usual; apex a little produced, subrectangular; the outer margin much rounded at the internal angle, the fringe reaching to the middle of the wing. The two branches of the 3rd subcostal are nearly of the same length, the triangular interspace being half as broad as long. The subcostal nervure is very remote from the costa.

Secondaries reach to the tip of the abdomen, in the ♀ passing a little beyond. Costa straight, apex rounded, outer margin very full, inner angle rounded continuously with it.

Legs slender, pilose, with long scales; hind tibial spurs long slender, of nearly the same length. Abdomen long, tip acute in ♂; in ♀ short with a spreading anal tuft.

Coloration consists of different shades of brown, with two oblique transverse lines from the inner margin outward towards the costa, the outer shortened by a line curved outwards from beyond the middle of the costa to a little above the inner angle, forming an inverted V.

The narrow front, the long, slightly ascending palpi, the simple, slender antennæ, and the very convex costa and style of coloration, will easily distinguish this genus from the remaining genera of Cochlidiæ with simple antennæ.

Cyrtosia elegans n. sp.

♀. Uniform olive brown with a bronze iridescence. The V-shaped line white, while the curved apical white line is very distinct, extending from a little above the apex around to just beyond the middle of the costa, where it is continued along the margin to the inner third of the wing. Secondaries a little paler, the apex and outer margin concolorous with the primaries.

Beneath a little paler, more glistening, the inner margin of the primaries and the secondaries below the costa and within the outer margin paler.

Length of body, .30; exp. wings, .82 inch.

Boston, (Mr. Sanborn.)

Cyrtosia fusca n. sp.

♂. Dull white, dusted with ochreous brown scales, thickest at the base of the wing. Head and thorax ochreous brown. Two parallel bands of brown, the outer one approaching the inner, and shortened by a straight line running from near the internal angle to the costa near the inner line. Beyond this line the apex of the wing is nearly white with a few ochreous scales. The wings are darker between the two lines, and especially so upon the costa.

Secondaries in color pale as the apex of the fore wings. Fringe interlined at its base and on the outer edge with dark. Beneath pale, the costal edge of the fore wings dark.

Length of body, .32; exp. wings, .75 inch.

Newburg, N. Y., (Coll. Mr. Edwards.)

Mr. Edwards reared the specimens described above from the larva, and it is hoped that we shall at some time be acquainted with the larval form and habits of a genus of this group hitherto unknown. The cocoon sent with the specimen is short and nearly spherical, about the size of a pea, and of a pale chestnut color. The pupa skin is very thin and fragile, not preserving its form at all after the moth has escaped.

Cyrtosia geminata n. sp.

♂. Very pale, dusted with ochreous brown, with two white spots near the internal angle. This is the palest species of the genus, its color being an ochreous chalky white. The middle of the fore wings is covered with a large triangular ochreous brown area, excavated deeply upon the internal angle, making a broad inverted V. Just above the internal angle are two unequal rounded triangular white spots, a little produced inwards, of which the upper is the larger. The base of the fringe is narrowly lineated with brown. Beneath more glistening, concolorous with the body and legs.

Length of body, .35—.40; exp. wings, .86—.90 inch.

Janesville, Md., R. Stratton, (Mus. Comp. Zoöl.) Phil. (Coll. Ent. Soc.)

This species, easily distinguished by its pale color and twin white spots, has broader wings than the other species of the genus.

Cyrtosia albipunctata n. sp.

Sable brown, with two white spots near the internal angle.

♂. Light sable brown. On the middle of the fore wings is a triangular chocolate brown space which divides upon the internal angle, while the outer narrower and shorter branch terminates just above the internal angle as in the preceding species, and includes two round unequal conspicuous spots. The secondaries are nearly concolorous, but a little lighter than the V-shaped place. Beneath paler brown, the border of the wings paler still, while the fringe is concolorous with the interior of the wing.

♀. Considerably larger; the female differs in the ground color being darker sable throughout than the ♂. The V-shaped area is chocolate brown, concolorous with the secondaries, and the twin spots are nearer alike in size. Beneath of the same color as the upper side of the secondaries, without the pale margin of the male. In both sexes the head and body beneath and legs are pale ochreous brown. The fringe is lighter than the wings, and interlined with sable brown.

Length of body, ♂, .35, ♀ .32; exp. wings ♂ 84, ♀ .94 inch.

New York, (Mr. Grote.)

CYCLOPTERYX nov. gen.

The head is very large, with large eyes. Front narrow, nearly square. Antennæ thick, with short thick pectinations on the basal half of their length. Palpi ascending, just passing beyond the front. Primaries subfalcate, very broad, being nearly two-thirds as broad as long; very convex towards the rounded apex. Outer margin continuously rounded with the internal edge, being more orbicular than usual. Outer edge convex below the apex.

Subcostal nervure is remote from the costa. The subcostal and median nervules and their interspaces are shorter than usual.

Hind wings reach to the tip of the abdomen, suborbicular. Costa short; apex continuously rounded with the very short internal margin. Legs stout; hind tibiæ very broadly scaled, spurs small, concealed by the long scales of the joint.

This genus connects those Cochlidiæ with partially pectinated antennæ, such as Euclea and Empretia; with the succeeding Tortriciform genera which have simple antennæ and shorter secondaries.

Cyclopteryx leucosigma n. sp.

♂. This fine species is of a rich cinnamon brown. The fore wings of a rich bright cinnamon color, with two linear short silvery lines; one is curved regularly inwards in the middle of the inner edge of the wing, and encloses a patch of brown of a lighter hue than the rest of the wing. The other is a costo-apical sigmoid line which begins on the costa just before the apex, and it presents the largest curve on its lower portion nearly opposite the excavation of the outer edge of the wing, it then curves around so as to merge imperceptibly to the straight dark discal linear spot which lies parallel to the costa. From the inner end of the lower transverse silvery line is a line of four or five dark spots which curves rapidly around parallel to the outer edge of the wing and terminates at the inner end of the silvery costo-apical line, thus connecting the two.

Secondaries of a duller brown, fringe of the inner angle slightly touched with dark brown. Beneath of a uniform pale brown.

Length of body, .30; exp. wings, .68 inch.

New York, (A. R. Grote.)

This pretty species may be easily recognized by the sigmoid silvery costal line being connected with the lower silvery line by a much curved row of four or five spots.

Cyclopteryx spinuloides.

Limacodes spinuloides Boisd., H.-Sch. Lep. Exot. Sp. Nov. Fig. 187 ♂, 188 ♀. (1854).

Limacodes? spinuloides Walk,, Cat. Lep. Br. Mus. V. (1855).

Morris, Synopsis Lep. N. Amer. p. 127. (1862).

Brookline, (Shurtleff.)

LITHACODES nov. gen.

Body slenderer than usual. Head large, vertex nearly continuous with the thorax. Front long quadrate. Antennæ long simple, filiform.

Palpi very long, curved upwards in front of the clypeus, reaching above the vertex, the third joint long, acute. Fore wings long and narrow, more regularly oblong than any of the other genera; costa hardly convex, outer margin nearly straight, suddenly rounded at the internal angle; inner edge very full at the base. 1st and 2nd subcostals short; upper branch of the 3rd subcostal long, so that the apical interspace is much longer and narrower than in *Limacodes.*

Apex of the secondaries rounded, outer margin full and rounded. Spines of the hind tibiæ large and stout. Genital armor much longer than in *Limacodes.*

This genus reminds us strongly of Hübner's genus *Lithacodia.*

Lithacodes fasciola.

Limacodes fasciola Boisd., Herrich-Schæffer, Lep. Ex. Sp. Nov. Fig. 186. (1854).
Limacodes ? fasciola Walk., Lep. Br. Mus. Pt. V. (1855).
Limacodes laticlavia Clemens, Proc. Acad. Nat. Sc. Phil. p. 157. (May, 1860).
Morris, Synopsis Lep. N. Amer. pp. 127, 128. (1862).

Brookline, July 9, (Shurtleff). Boston, (Sanborn). N. Y. (Grote). "Illinois, Kennicot" (Clemens).

HETEROGENEA.

Heterogenea Shurtleffi, n. sp.

♂. Fore-wings of a uniform brown, reflecting a purplish lustre, the outer half of the wing especially tinged with brown. Costa yellowish brown; apical region dark. Secondaries much darker, of the same color on the upper and under side of both wings. Beneath the costa of the fore-wings concolorous with the upper side, but dilated at the apex. Legs testaceous.

♀. Yellowish brown, concolorous with the costa of the ♂. A middle oblique, narrow, dark line. An obsolete line of dark scales from the outer two-thirds of the costa curves outwards to the outer margin, just above the internal angle. Fringe bilineated with dark, tipped at the apex with black scales. Secondaries dark, fringe plain, pale testaceous. Beneath yellowish, a little lighter than the primaries above.

Length of body ♂ .20, ♀ .25; exp. wings ♂ .50, ♀ .60.

The sexes were found united July 16, on the Gleditschia tricanthus at Brookline, (Shurtleff.)

I take a melancholy pleasure in naming the only species of this genus as yet discovered in this country after the late Mr. Carleton A. Shurtleff of Brookline, a fellow-student in Entomology. Mr. Shurtleff was a most enthusiastic lover of nature, and specially interested in studying the habits and anatomy of insects. His collection embracing many rare insects, including several unique species mentioned in this paper, has been placed in the collection of the Boston Natural History Society.

ISA nov. gen.

Front of the head full and square. Antennæ simple. Palpi porrect, not surpassing the front; third joint very small, acutely conical. Body rather stout. Fore wings a little more than one-half as wide as long; costa more convex than usual in the middle, apex a little produced, outer edge equaling in length the inner edge, below the apex slightly excavated, thence very oblique to the internal angle. Inner margin short, convex in the middle. 2nd subcostal turning towards the costa at an angle of 45° from its nervure; upper branch of 3rd short and parallel with it, but the distance between the two is much greater than usual. The apical interspace is shorter and more broadly triangular than usual. 1st median nervule is more continuous with its main nervure than usual. Costa of the hind wings more convex than usual. Internal angle distinct. Outer margin rounded, bent slightly in the middle. Legs stout, densely pilose externally. Inner tibial spur the longest; tarsi stout and thickly scaled.

Isa texula.

Limacodes texula Boisd., Herr.-Sch., Lep. Exot. Sp. Nov. Fig. 184. (1854).
Limacodes? texula Walk., Cat. Lep. Br. Mus. Pt. V. (1855).
Morris, Synopsis Lep. N. Amer. p. 128. (1862).

Penn., (Harris Coll.)

TORTRICIDIA nov. gen.

Front square, but a little higher than wide. Antennæ thick at the base in both sexes, simple. The scales spreading a little at the end of each joint. Palpi long, slender, ascending, 2nd joint long and slender, 3rd continuous with it, either long and slender, or shorter and conical. Primaries one-half as wide as long; costa convex, apex rotund pointed; outer margin oblique; fringe gradually becoming wider towards the internal angle. 1st subcostal nervule nearly as long as the costal nervure. 2nd s. c. parallel with the first; 3rd s. c. approximate and nearly parallel with the costa. A distinct discoidal fold terminates between the 5th s. c. and 1st median. Hind wings broadly subtriangular; costa straight, hardly rounded at the apex; outer and inner edges continuously rounded.

The discal area is short and narrow. Legs long and slender, scales thin and long; tibial spurs long. The outer lateral genital claspers in ♂ are very long, meeting beyond the termination of the other pieces.

Tortricidia pallida.

Limacodes pallida Boisd., H.-Sch. Lep. Exot. Sp. Nov. Fig. 183. (1854).
Limacodes ? pallida Walk., Cat. Lep. Ins. Br. Mus. V. p. 1148. (1855).
Morris, Synopsis Lep. N. Amer. p. 128. (1862).

"June 15, July 1," (Harris Coll)

Tortricidia testacea, n. sp.

Light ochreous brown. Head, front margin of the thorax, abdomen and legs darker. Nervules of the primaries and costa dark ochreous, as also the middle of the wing, forming a broad diffuse band widening towards the apical portion of the costa. Secondaries of a pale glistening ochraceous.

Length of body, ♂ .30, ♀ .40; exp. wings, ♂ 80, ♀ 1 inch.

"July." (Harris Coll.) Dorchester, Mass. (Sanborn.)

Tortricidia flavula.

Limacodes flavula Boisd., H.-Sch. Lep. Exot. Sp. Nov. Fig. 185. (1854).
Limacodes ? flavula Walk., Cat. Lep. Ins. Br. Mus. V. (1855).
Morris, Synopsis Lep. N. Amer. p. 128. (1862).

"Nova Scotia." (Walker.)

Subfamily PSYCHIDÆ Boisduval.

PHRYGANIDIA nov. gen.

Front broad, narrowing towards the mouth, sides parallel. In the female the clypeus is shorter than in the male. Maxillæ as long as the thorax. Palpi ascending, curved, very narrow and slender, tips just passing beyond the front; 3rd joint continuous with the second. Antennæ long and broadly pectinated, in the ♀ subsimple, pectinations being nearly obsolete.

Thorax moderately stout, the patagia are more hairy than the remainder of the thorax. Wings long and broad. Primaries: length to breadth as 7½ to 3¾. Costa slightly convex, straight in the middle. Apex subrectangular, obtusely rounded. Outer margin moderately oblique. 1st subcostal straight, arising just before the origin of the 3rd s. c.; 2nd arises more than half-way between the origin of the 3rd and 5th;

3rd divides in the middle of its length, the interspace being short triangular. 5th subcostal is slightly removed at its origin towards the middle of the discal space. 2nd and 3rd median nervules are very short, dividing on the first third of the distance from the discal nervules. 4th median very short.

Internal angle of the secondaries much rounded, hardly reaching to the tip of the abdomen. Costa straight, a little full near the base, while the wing is much produced towards the much rounded obtuse apex, being still more rounded in ♀. The two subcostal nervules are thrown off very near the apex. In both wings the two discal nervules are continuous and very oblique. The 2nd and 3rd median are very short, arising very near the outer margin of the wing.

Legs long and slender, closely and finely scaled; hind tibiæ long, provided with four moderate equal spurs; tarsi nearly as long as tibia. Abdomen cylindrical, long, rather slender, tip obtuse. In the ♀ it is shorter and obtuse.

This genus is not only much larger than *Heterogynis* but differs from it in many respects. On comparing our species mentioned below with *H. penella* from Southern France, received from Prof. Zeller of Meseritz, I find the antennæ of Phryganidia are shorter in proportion, and more broadly pectinated. The costa of the fore-wings is straight, and the apex rectangular, instead of being rounded as in the European genus, and the whole wing is broadly triangular, as are the hind wings, which only reach to the tip of the abdomen, while in *Heterogynis* they reach beyond. The neuration of the two genera is very dissimilar. In our genus the median nervules are longer, and arise much nearer the middle of the wing, especially the 4th median. The 2nd and 3rd median nervules in both wings are in *Heterogynis* remote at their origin, while in Phryganidia they arise from a common branch which is thrown off from the main nervure. This is very abnormal in the moths, and in this present example is evidently the result of the wonderful analogies of this group to the Phryganidæ, and the Neuroptera generally, where these irregularities in the arrangement of the nervures and their branches, becomes almost a law.

Phryganidia californica n. sp.

Sable brown, partially transparent. Antennæ and nervules darker.

Costa straight, apex obtuse, subrectangular. The secondaries in the ♀ hardly reach to the tip of the abdomen.

Length of body, ♂ .60, ♀ .42; exp. wings ♂, 1.47, ♀, 1.22 inch.

So difficult is it to discover the specific differences in the imago of this and allied genera, which are chiefly those of size and structure, that this description, so meagre, must remain imperfect until additional species occur.

Though no typical Psychidæ are known to inhabit the New England and Middle Atlantic States, I have seen in the possession of Prof. Townend Glover, of the Maryland Agricultural College, some beautiful drawings illustrating the transformations of a Florida species, allied to the European and above mentioned Californian genus.

THYRIDOPTERYX Stephens.

Thyridopteryx ephemeræformis Stephens.

Sphinx ephemeræformis Haworth, Lep. Brittanica. (1810).
Thyridopteryx ephemeræformis Steph., Ill. Br. Ent. Haust. II. p. 387. (1834).
Walk., Cat. Lep. Br. Mus. IV. p. 960. (1855).
Morris, Synopsis Lep. N. Amer. p. 142. (1862).

I refer to this species, a ♂ specimen in the Harris collection, probably received by him from Pennsylvania. It is fuscous and brown, the under side of the head and thorax, and the upper part of the fore femora, are pale yellowish. The body is brown. Abdominal tuft yellowish white beneath and on the sides. Wings fuscous; costa brown; three transverse oblique nearly opposite rows of brown spots on the nervules of the fore wings; the third row is composed of but two spots, the lower being near the internal angle, while the other forms the discal discoloration. Fringe paler on the nervules. Internal margin of the hind wings brown, remainder nearly transparent.

Length of body, .40; exp. wings, .80 inch.

Thyridopteryx nigricans n. sp.

Another species of the same size as the preceding is in the collection of Mr. Sanborn. It is nearly black. Head beneath and the middle femoral tufts and under side of the tip of the abdomen are yellowish white. Base of the primaries mottled with fuscous. Fringe fuscous brown.

This specimen was raised by Mr. Sanborn from a cocoon received from the Middle States, I believe. The moth appeared in February, having been kept in a warm room.

The cocoon was leathery brown in color, of tough, hard consistance, lined within with silk. In form it was short oval, nearly spherical, though still longer than the cocoons of the Cochlidinæ, which it closely resembled, thus showing the near relationship of the two subfamilies.

ŒCETICUS Guilding.

Œceticus coniferarum Harris (MSS.).

Our species, found in the Middle States, is of an uniform soft dark sable brown. The body is .60 inch long, and the wings expand one inch. I have received the cocoons of this species from Newbern, N. C., through Mr. Shute.

LACOSOMA Grote.

Lacosoma chiridota Grote.

Platypteryx erosa Harris, Cat. Ins. Mass. p. 74. (1835).
Lacosoma chiridota Grote, Proc. Ent. Soc. Phil. iii. p. 77, pl. 2, fig. 8. (1864).
Penn. Melsheimer, (Harris Coll.)

This interesting genus seems to connect the true Psychidæ with Perophora. It resembles this last named genus in its broad head, the broadly pectinated antennæ, the general form of the wings and in its coloration, like that genus having but a single outer line common to both wings and a discal dot upon each wing.

This is a rare moth, and we look with interest for information concerning its habits and tranformation.

PEROPHORA Harris.

Perophora Melsheimerii Harris.

Perophora Melsheimerii Harris, Rt. Ins. Mass. p. 299. (1841).
3rd ed. Pl. VI. fig. 5. *cocoon* fig. 4. *larva* fig. 206. (1862).
Walk., Cat. Lep. Br. Mus. IV. p. 975. (1855).
Morris, Synopsis Lep. N. Amer. p. 142. (1862).

Subfamily PTILODONTES Hübn.

ICHTHYURA Hübner.

Ichthyura inclusa Hübner.

Ichthyura inclusa Hübn., Zutr. Dritt. Hund. p. 36. fig. 561, 562. (1825).
Clostera americana Harris, Rt. Ins. Mass. p. 314. (1841).
3rd ed. Pl. VI. fig. 12. and figs. 213-215.
Fitch, Fifth Rt. Nox. Ins. N. York. p. 65. (1859).
Ichthyura inclusa Morris, Synopsis Lep. N. Amer. p. 244. (1862).
Mass. (Shurtleff, Sanborn.) Maine.

Ichthyura inversa n. sp.

Smaller and of a darker color than the preceding species, and with the costa of the fore wings more convex. The light portions of the primaries of *I. inclusa* are in this species densely dusted with brown scales. The reddish brown line from the vertex on to the crest is narrower than in that species. The basal line is dislocated as usual, but the lower portion is slightly waved, as are the lines without, which are situated as in *I. inclusa*, but waved. The inverted V on the discal nervules is more distinct; the brownish tinged subapical region bordering the upper half of the fourth line is narrower, and of a deeper red than in the preceding species, while the submarginal series of linear spots is not so distinct. A lighter line crosses the secondaries beyond their middle.

Beneath a little darker; a common line much more distinct than in *I. inclusa* is margined with reddish on the costa of the primaries.

Length of the body ♂ .55, ♀ .65; exp. wings ♂ 1 inch, ♀ 1.30 inch.

Maryland, (Edwards.) Janesville, Md., (Mus. Comp. Zool.)

Ichthyura indentata n. sp.

♂. Dark cinereous. Palpi brown on the upper side. A short, broad brown line from between the antennæ to top of the crest. Basal line straight, with an outward fold. Second line arcuated outwards, meeting the short third line on the median nervure. The fourth line extends only to the second, making a short V. On the outer third of the costa a deep white oblique spot, which is the termination of the partially obsolete fourth line. This spot is surrounded by deep reddish brown, which is much darker towards the apex. A submarginal slightly arcuated series of dark spots. Secondaries with no transverse line. Beneath concolorous with the upper side of the secondaries. Indented spot margined with brown on the costa, but fainter than on the upper side.

Length of body ♂, .45; exp. wings 1 inch.

"New Hampshire, Leonard," (Harris Coll.)

Ichthyura albosigma Morris.

Clostera albosigma Fitch, 2nd Rt. Nox. Ins. N. York. p. 274. Pl. 2. fig. 4. (1856).
5th " " " " p. 64. (1859).
Morris, Synopsis Lep. N. Amer. p. 244. (1862).

Dorchester, July 15, (Sanborn.)

Ichthyura vau Morris.

Clostera vau Fitch, Fifth Rt. Nox. Ins. N. York. p. 65. (1859).

Ichthyura vau Morris, Synopsis Lep. N. Amer. p. 244. (1862).

This species seems to differ from *I. inversa* in having no pale band across the secondaries. They may yet prove to be identical.

APATELODES nov. gen.

Front of the head rather broad subtriangular. Antennæ in ♂ evenly branched to the tip, as long as the thorax. Palpi slightly ascending, reaching to the front, tips broad; third joint minute, concealed. Primaries triangular, broad; costa straight, outer margin incised just below the apex, which is acutely produced, especially in the ♀. Below the apex the outer edge of the wing is oblique, not indented, but making an obtuse angle with the straight inner edge. Costal nervure extending nearer the apex than usual. Second and third subcostal nervules suddenly deflexed upon the costa. Apical interspace broadly triangular. The 4th subcostal arises in the middle of the wing. Discal area short and broad.

Secondaries large, full and rounded on the outer margin, of an irregular pentagonal form, reaching nearly to the tip of the abdomen. Femora densely pilose, giving the joint an oval form; hind tibiæ with four large spurs. Abdomen of ♂ slender, and provided with two lateral tufts on each side of the tip.

This genus approaches the Dasychiræ in possessing very heavily pectinated antennæ, large clavate palpi, a stout woolly thorax, and a slender, tapering abdomen; also in having large hind wings, and heavily tufted legs, and, in some respects, in the peculiar brown colors.

The larva is also hairy, with long pencils of parti colored hairs, which is characteristic of the preceding group. This genus in its larval stage, judging from Abbot's drawing, bears a striking resemblance to the larva of *Apatela americana*, which has suggested the generic name. Our species cannot be referred to *Parathyris* Hübner, of which *P. cedo-nulli* (Cramer sp.) is a type, and the term *Pygæra* has been restricted to an European group.

Apatelodes torrefacta.

Phalæna torrefacta Smith, Nat. Hist. Lep. Georgia. p. 151. Tab. 76. (1797).

Pygæra torrefacta Hübn., Verz. p. 162. (1816).

Parathyris torrefacta Walk., List. Lep. Ins. Br. Mus. V. p. 1088. (1855).

New York, (Grote.) Boston, (Sanborn.)

Apatelodes hyalino-puncta n. sp.

♀. Very uniform pale cinerous. Head, legs and thorax concolorous. On the inner third of the primaries is a straight, rather broad, darker band, which increases in width towards the costa. Beyond the mesial broad pale gray band, the wing is darker. The costal edge is fuscous, the mesial crest of the thorax is tipped with brown, and beyond the middle of the patagia is a narrow transverse line. Secondaries fuscous gray, with an indistinct submarginal line slightly waved and edged with gray. The upper part of the abdomen is reddish. Fringe darker.

Beneath the primaries are crossed by two bands, the inner fuscous, the outer dark gray. The margin of the wing is dark gray, especially the fringe. The thin broad tuft on the hind tibiæ are edged with brown. On each side of the base of the abdomen is a broad oblong spot, edged broadly with white before and behind.

The species derives its name from a peculiar square transparent spot edged with brown, situated just below the apex of the fore-wing, nearly opposite the middle point of the wing. The lower sub-c. nervule separates it from a much smaller adjoining one in the extra discal space.

This female differs from a male *A. torrefacta* in having both wings well dentated, the apex much more acute, the outer margin more oblique, and in having much smaller palpi. In coloration it is quite distinct, since it does not possess the prominent lines and spots of *A. torrefacta*. Both species have the subapical square transparent spot, but in *A. torrefacta* it is small and inconspicuous, while a second adjoining one is wanting.

Length of body, .85; exp. wings, 2 inches.

Taken in Medford, Mass., by W. H. Dall, (Mus. Comp. Zool.)

DATANA Walker.

Datana ministra Walker.

Phalæna ministra Smith, N. H. Lep. Ins. Georgia, p. 161. Tab. 81. (1797).
Drury, Illustr. Vol. 2. p. 25. pl. 14, fig. 3. (1773).
Pygæra? ministra Harr., Cat. Ins. Mass. p. 73. (1835).
Rt. Ins. Mass. p. 312. (1841).
Third ed. pl. VI. fig. 6. fig. 212. (1862).
Petasia ministra Westw. Edit. Drury, Illustr. II. p. 27, pl. 14. (1837).
Datana ministra Walk., Cat. Lep. Br. Mus. V. (1855).
Eumetopona ministra Fitch, 2nd Rt Nox. Ins. N. York, p. 235, pl. 4, fig. 3. (1856).
3rd Rt. p. 19. (1657).
Datana ministra Morris, Synopsis, Lep. N. Amer. p. 247. (1862).

Brookline, (Shurtleff.) Maine.

Datana contracta Walker.

Datana contracta Walk., Cat. Lep. Br. Mus. V. (1855).
Morris, Synopsis Lep. N. Amer. p. 247. (1862).

"N. America," Walk.

GLUPHISIA.

Gluphisia trilineata n. sp.

Light cinereous, primaries lighter than the thorax. Two transverse darker lines, enclosing an obscure yellowish band. The first line straight, second oblique, with two large teeth pointing inwards on the submedian interspace, and on the 4th subcostal. A submarginal twice bent line, angulated obtusely in the second median interspace, and on the subapical space. Fringe dark at the base and at the ends of the nervules. Secondaries nearly white, not discolored. Beneath uniform light ashen.

Length of body ♂ .40—.45, ♀ .55; exp. wings ♂ 1—1.10, ♀ 1.25 inch.

Cambridge, (Harris Coll.) N. York and Middle States, (Grote and Coll. Ent. Soc. Phil.)

The submarginal line varies in being twice or many times undulated. In the female the yellowish band is more distinctly marked than in the other sex. The species will be recognized by the uniform cinereous tinge, the three transverse lines on the primaries, the yellowish band limited within by the straight line, without by the oblique waved line; and the plain outer half of the wing, interrupted near the margin by the rather obscure twice waved darker line, and the plain hind wings. It might easily be mistaken for a species of Cymatophora.

HYPARPAX Hübner.

Front of the head densely pilose between the antennæ, which in the female are subsimple, joints beneath being setiferous. Palpi porrect, slender, second joint a little pilose beneath, third joint slender acute. Primaries two-thirds as broad as long, being broadly subtriangular. Costa at base a little full, straight; apex pointed; outer margin equal in length to the inner margin. The secondaries reach nearly to the tip, outer margin not rounded. Legs pilose. Two long apical spurs on the posterior tibiæ. Tip of the abdomen pointed, not tufted.

Hyparpax aurora.

Phalæna aurora Smith, Nat. Hist. Lep. Ga. p. 173. Tab. 86. (1797).
Hyparpax aurora Hübner, Samml. Exot. Schm. Bd. 2. Pl. 168. (1806).
Datana? aurora Walk., Cat. Lep. Br. Mus. V. p. 1062. (1855).
Morris, Synopsis Lep. N. Amer. p. 247. (1862).

"Cambridge," (Harris Coll.)

NADATA Walker.

Nadata gibbosa Walker.

Phalæna gibbosa Smith, N. H. Lep. Ins. Georgia, p. 163. Tab. 82. (1797).
Cormotricha gibbosa Hübn., Samml. Exot. Schm. III. Pl. 19, fig. 1—4.
Nadata gibbosa Morris, Synopsis Lep. N. Amer. p. 248. (1862).

"Larva on Oak, Waltham, Sept. Winged June 20," (Harris Coll.) Boston, (Sanborn.) New York, (Grote.) Brunswick, Maine.

Nadata Doubledayi n. sp.

Compared with *N. gibbosa* the antennæ are not so broadly and heavily pectinated, the branches decrease much more rapidly in size, the front of the head is broader, and the tufts at the base of the antennæ are more spreading and conspicuous. The palpi are smaller and tipped with black, when in *N. gibbosa* they are tawny throughout. This species is throughout lighter colored. The costa of the primaries is not so convex towards the apex, outer margin hardly scalloped, and the very shallow scallops are filled in with brown instead of silvery scales, as in *gibbosa*. The two transverse lines are paler and more sinuate. The two discal dots are the same, but the inner clear tawny space is much paler in *Doubledayi*. The secondaries are paler and lighter, and not margined with brown. Apex more rectangular, and the outer margin not so full as in *gibbosa*, while it is smaller, while the thoracic tuft is broader at the base, and above more acute.

Length of body ♂, .85.

Dedicated to Mr. E. Doubleday, who, when traveling through the United States, added so much to our knowledge of this family, and who, in his letters to Harris, indicated that there were three species of this genus existing in this country.

Newburg, New York, (Edwards.)

NOTODONTA Ochsenheimer.

Notodonta basitriens Walker.

Notodonta basitriens Walk., Cat. Lep. Br. Mus. V. (1855).
Morris, Synopsis Lep. N. Amer. p. 239. (1862).
Grote, Pr. Ent. Soc. Phil. iii. p. 93. Pl. 11. fig. 1. ♂. (1864).

Notodonta stragula Grote.

Notodonta stragula Grote, Pr. Ent. Soc. Phil. iii. p. 93. Pl. 11. fig. 2. ♂. (1864).

♀. Brookline, (Shurtleff.)

LOPHODONTA* nov. gen.

Head larger than in Notodonta, and the pilose front is more prominent than in that genus. Palpi porrect, stout, passing in ♂ a little beyond the front. Pectinations of antennæ much longer than in Notodonta. Prothorax slightly crested. Fore wings more triangular than in the preceding genus; costa straight, apex obtusely pointed. Inner margin nearly straight, tufted prominently at the angle. The discal nervules are placed near the outer third of the wing, so that the 4th and 5th subcostal nervules are much shorter than in the allied genus. Intercostal area long linear. Secondaries in the ♂ even with the tip of the abdomen; costa straight, outer margin much shorter than in Notodonta. Legs like Notodonta.

Lophodonta ferruginea n. sp.

Ferruginous or brick red and blackish cinereous. The head and prothorax are ashen black, while the rest of the thorax and fore-wings are ferruginous. Base of the fore-wings ferruginous, interrupted on the costa by two white short lines. Beyond is a dark band, shaded within with ashen, and lined without by four dirty white lunules, which are margined externally with a ferruginous line. Towards the costa beyond this line and within the geminate nearly united dirty white discal dots are some transverse irregular whitish discolorations. The outer third of the wing is darker than the middle, while the nervules are almost black. There is a submarginal waved lunate dirty white line, and while the fringe is dark, opposite the ends of the nervules it is whitish. The tuft on the inner margin is broad and dark. The secondaries are dirty white, with a mesial obscure band, becoming brown towards the costa, which is margined without with whitish. Beyond is a broad dusky band, more distinct upon the costa, margined without with a short white line, becoming more distinct upon the costa, where it is twice waved. Margin black, fringe dusky cinereous and concolorous with the abdomen.

The body beneath is much lighter, and the wings are still paler, being dirty white and crossed by a common mesial obscure dusky line, while the margin next the fringe is dark brown, interrupted by the nervules.

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*Λόφος tuft; ὀδούς tooth.

Length of body ♀ .70; exp. wings, 1.95 inch.

Mass., (Sanborn.)

Notodonta dromedarius of Europe, though a smaller species, is congeneric with our species, resembling it closely in its coloration and style of marking.

Lophodonta angulosa.

Phalæna angulosa Smith, Nat. Hist. Lep. Ga. p. 165. Tab. 83. (1797).
Notodonta angulosa Walk., Cat. Lep. Br. Mus. V. (1855).
Notodonta georgica H.-Sch., Lep. Exot. Sp. Nov. p. 66, fig. 384. (1855).
Notodonta angulosa Morris, Synopsis Lep. N. Amer. p. 239. (1862).

"Milton, Mass., June 17, inactive on trunk of an oak." (Harris Coll.)

PHEOSIA Hübner.

Pheosia rimosa n. sp.

Of a delicate frosty white and brown. Along the ends of the subcostal nervules of the primaries are long streaks of brown. In the apical and subapical spaces are two long longitudinal broad streaks, oblique and parallel to the costa, which terminate just before the apex. Middle of the wing white. A long broad line extends from the base to just above the inner angle on the outer margin, lined below with white, and deflected upwards along the outer edge. Tuft cinereous. Beneath cinereous, costa darker. ♀ darker than the ♂.

Secondaries white, region of the internal angle and tuft dark brown. Legs and abdomen cinereous.

Thorax and head cinereous, tuft on the patagia tipped with dark brown. Fringe interlined at base with white.

Exp. wings ♂, 2 inches.

Newport, R. I., (Coll. Mrs. Bridgham.)

NERICE Walker.

Nerice bidentata Walker.

Nerice bidentata Walk., Cat. Lep. Br. Mus. V. p. 1076. (1855).

New York, (Grote.)

EDEMA Walker.

Edema albifrons Walker.

Phalæna albifrons Smith, N. H. Lep. Ga. p. 159. Tab. 80. (1797).
Edema albifrons Walk., List. Lep. Br. Mus. V. p. 1828. (1855).
Morris, Synopsis Lep. N. Amer. p. 242. (1862).

Mass. (Sanborn, Mrs. Bridgham.)

Edema producta Walk., List. Lep. Br. Mus. V. (1855).
Morris, Synopsis Lep. N. Amer. p. 241. (1862).
"Florida." (Walk.)

CECRITA Walker.

Cecrita guttivitta Walker.
Cecrita guttivitta Walk., List. Lep. Br. Mus. V. (1855).
Nova Scotia. (Walker.)

Cecrita? bilineata n. sp.

Cinereous. Upper side of the palpi and end of the patagia dark. Primaries crossed by a basal and outer waved and angulated line, margined on each side with blackish. The basal line is angular inwards on the internal nervure, is rounded outwards across to the subcostal and acutely angulated on that nervure. Outer line angulated outward on the internal, and waved and angulated to the costa. Between this line and the outer margin is a faint band. Between the two principal lines are some black scales; a few black scales mark the obsolete discal spot. Towards the apex on the costa are four dark spots.

Secondaries smoky, a little discolored at the internal angle, beneath concolorous. The ♀ wants the few black scales between the two principal lines.

Length of body ♂, .70, ♀ .75; exp. wings ♂, 1.50, ♀ 1.50.

Dr. Harris has reared this from the larva, which pupated July 25; imago Aug. 15.

Cecrita? mustelina n. sp.

♀. Uniform light sable brown. End of shoulder tippets (patagia) edged with black. Lower half of fore-wings sable brown, as well as the outer portion near the margin nearly up to the costa, while the rest of the wing is dark ashen. Nervules dark. A small black discal spot. A costo-apical black spot.

Secondaries sable brown, of the same color beneath.

Length of body .75; exp. wings 1.65 inch.

"Camb., June 15." Harris. (Coll. Harr.)

ŒDEMASIA nov. gen.

Head unusually prominent; vertex with a prominent narrow acute tuft projecting horizontally out between the eyes, and continued down the sides of the front, while above and next the prothorax is a triangular pit. Antennæ pectinated on the basal two-thirds. Maxillæ slender. Palpi porrect, hardly reaching the front; second joint pilose beneath; and they are somewhat obtuse, since the hairs on the second joint reach to the end of the third, which is distinct, short and somewhat pointed.

Thorax smooth not pointed; primaries a little less than one-half as broad as long; costa nearly straight, bent downwards more than usual at the apex. 2nd subcostal nervule anastomoses with the third by a short branch, so that the intercostal area is a long linear produced rhomboid.

Secondaries reach but little beyond the basal half of the abdomen; costa full at the base, thence nearly straight to the rounded apex. Outer margin regularly rounded, slightly angulated in the middle. Costal nervure runs very nearly parallel to the subcostal, diverging at the discal nervules. Legs short, femora and tibiæ densely pilose, the scales of the hind tibiæ especially long and spreading. Abdomen of the ♂ with a bifid tuft, and also slight lateral tufts, while the tip in the female forms a smooth cone, which suddenly tapers and bends downwards from the rest of the abdomen.

This genus differs from *Schizura* Doubleday, by its shorter palpi, its more obtuse apex of the fore-wings, and the shorter and more rounded hind-wings. The species are of smaller size and have no prominent style of coloration, except that they are usually cinnamon brown, with a marginal row of brown spots.

Œdemasia concinna.

Phalæna concinna Smith, N. H. Lep. Ga. p. 169. Tab. 85. (1797).
Notodonta concinna Harris, Rt. Ins. Mass. p. 309. (1841).
Third edit. Pl. vi. fig. 11. (1862).
Edema concinna Walk., List. Lep. Br. Mus. V. (1855).
Notodonta concinna Fitch, Third Rt. Ins. New York, 342. (1856).
Edema cincinna Morris, Synopsis Lep. N. Amer. p. 242. (1862).

"Georgia." (Harris Coll.) Mass. (Sanborn.)

Œdemasia nitida n. sp.

♂. Head and thorax cinereous. Primaries very pale tawny in the middle between the cinereous costa and the brown inner margin. At the base along the median nervure is a dark streak. There are three dark spots on the costo-apical margin, another faint linear minute streak in the apical interspace. In the two spaces below are two faint linear long light lines parallel to the nervules. A minute discal dot is succeeded by a linear streak which reaches to the outer margin. Near the internal angle are two unequal linear spots. A faint row of marginal brown dots. Secondaries white, with a dusky discoloration at the inner angle. Fringe brown on the nervules.

Beneath pale, primaries a little dusky without, the three costo-apical dots and spotted fringe apparent.

♀. Base of the primaries fuscous, and a distinct submedian dark basal streak. Externally the wings are cinereous. A minute discal dot, with a faint brown streak beyond. The two geminate costo-apical streaks are more distinct than in ♂, as are the two larger spots near the internal angle, and the marginal row of dots are more distinct. Hind wings dark cinereous.

Length of body ♂ .65, ♀ .60; exp. wings ♂ 1.20, ♀ 1.10 inch.

Janesville, Maryland. (Mus. Comp. Zool. Stratton.)

Œdemasia badia n. sp.

Vertex and prothorax reddish-brown. Palpi and patagia behind blackish. Primaries dark reddish-brown with cinereous and dark-brown scales. Base of the wings reddish. Before the discal mark a cinereous region in the discal space. No distinct discal mark, but that region is discolored with dark brown and continued to the outer margin and to two black lines, one on the 5th subcostal which dilates towards the white apex of the wing. Outer margin with black and whitish streaks on the nervules and in the interspaces.

Secondaries smoky towards the outer margin, especially on the nervules. Beneath smoky cinereous; on the outer margin of the primaries is a row of black dots; ends of the nervules black.

Length of body, .55; exp. wings, 1.15 inch.

Mass. (Sanborn.)

Mr. Shurtleff loaned me another ♂ specimen which has much darker patagia than the rest of the thorax; the middle yellowish ashen region of the fore-wings is bounded on each side by zigzag lines, while the anterior part of the wing is slightly frosted over. Costal third of the wing white, the marginal row of dots are each succeeded within by white streaks. Abdomen pale cinereous, darker than the secondaries, tip not so distinctly divided as in *Œ. concinna.* It may easily be distinguished by its deep red color, dark shoulder tippets and light hind wings. The fore-wings have the linear discal spot turning at right angles outwards, and the two reddish-brown longitudinal lines proceed from it to the outer margin of the wing.

Length of body ♂, .65; exp. wings 1.30 inch.

DASYLOPHIA* nov. gen.

Vertex of the head with two erect high acute tufts, the tips of which meet over the vertex reaching to the level of the thorax in ♀, a little shorter in ♂. Antennæ with long slender pectinations on the basal two-thirds, while the remaining third is provided with lateral setæ; in ♀ simple. Palpi slightly ascending; 3rd joint passing beyond the front, 2nd joint slightly curved upwards, scales beneath the joint being short; 3rd joint is half as long as the second, porrect, being directed forwards at a slight angle with the 2nd joint.

Thorax short, scales of the prothorax distinctly marked.

Fore-wings hardly one-half as long as broad; costa very slightly concave in the middle, towards the tip a little convex; outer margin oblique; internal angle obtuse, the inner edge near the base of the wing is full in ♂, in ♀ straight.

The costa of the hind wings is long and straight; apex subrectangular, from thence the outer margin is longer than usual and slowly rounded to the not very distinct internal angle. The wings reach to the basal two-thirds of the abdomen.

Legs pilose, the anterior femora densely pilose, in ♀ longer, and more irregularly and thinly pilose. Abdomen long cylindrical, with lateral tufts, and tip of ♂ slightly tufted.

In coloration the species are generally gray, with dark streaks running parallel to the nervules; there is a distinct basal longitudinal mesial streak, and an outer very distinct geminate curved line.

The long slender acute palpi, the high vertical conical tuft, the slight concavity of the basal two-thirds of the costa of the fore-wings, and the long slender cylindrical abdomen of the ♂ will distinguish readily the species of this genus.

Dasylophia anguina.

Phalæna anguina Smith, N. H. Lep. Ins. Ga. p. 167. Tab. 84. (1797).
Notodonta anguina Harris, Cat. Ins. Mass. p. 73. (1835).
Datana? anguina Walk., List. Lep. Br. Mus. V. (1855).
Drymonia cucullifera H.-Sch., Lep. Exot. Sp. Nov. p. 66. Fig. 381. (1855).
Datana? anguina Morris, Synopsis Lep. N. Amer. p. 247. (1862).

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* Δασύς tufted; λόφος vertex.

"Waltham, *Larva* Sept., *Moth* June 10, July 20." Harris. (Harris Coll.) Brookline (Shurtleff.)

Dasylophia interna n. sp.

♂. Light sable brown. Palpi above blackish. Sides of the vertical tuft grayish. Prothorax with a faint dark line. Middle of the wing grayish, dusted coarsely with brown, limited by a median dark nearly straight line. At the outer three-fourths of the internal margin is a dark line margined half-way with gray which curves over on to the outer margin, being about the same distance from the internal angle as its opposite end. The outer half of the inclosed region is darker. Costa towards the apex interrupted by gray spots, more distinct beneath. A submarginal row of very oblique dark linear spots between the nervules, succeeded by lighter longer streaks of light tawny white. Fringe gray, with dark spots. Pectinations of the antennæ are a little longer than in *D. anguina*. Tarsi tipped with lighter scales.

Length, when wings are folded, .90 inch.

"Dublin, N. H. Leonard." (Harris Coll.)

SCHIZURA Doubleday.

Schizura ipomeæ Doubleday.

Schizura ipomeæ Doubl., Entomologist, p. 59. (1841).

Heterocampa (*Schizura*) *ipomeæ* Walk., List. Lep. Br. Mus. V. (1855).

Heterocampa ipomeæ Morris, Synopsis Lep. N. Amer. p. 241. (1862).

"Florida." (Doubleday.)

CŒLODASYS * nov. gen.

On the vertex of the head is a vertical flattened horizontal tuft, hollowed above, and projecting out between the antennæ. Front of head pilose. Antennæ pectinated on the basal two-thirds, or three-fourths; simple in ♀. Palpi very obtuse, short porrect, hardly reaching the front; 3rd joint small and short; 2nd joint pilose beneath, the scales reaching to the tip of the 3rd joint, and meeting beneath. Maxillæ short. Below the head and in front of the first pair of legs is a large conical tuft of hairs. The primaries are a little less than half as long as broad; costa nearly straight, slightly convex towards the apex which is acuter than usual; outer margin slightly angulated on the 5th subcostal, below being more oblique. Intercostal area very long, linear.

Secondaries somewhat pointed at the apex; costa nearly straight, bent downwards a little, near the apex; outer margin long, the lower half disposed to be parallel with the costa of the primaries. They reach to the basal two-thirds of the abdomen. Legs short, femora and tibiæ densely pilose. The tibiæ are shorter than usual and broadly pilose. Outer tibial spurs twice the size of the inner. Tarsi small.

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* Κοῖλος hollow, δασύς tuft.

Abdomen much slenderer than usual; anal tuft of ♂ bifid.

In the female the fore-wings are broader, not so angulated on the outer margin, the secondaries are more produced at the apex, and they reach nearer the tip of the addomen than in the male.

Cœlodasys unicornis.

Phalæna unicornis Smith, N. H. Lep. Ga. p. 170. Tab. 86. (1797).
Hyboma unicornis Hübn. Verz. p. 200.
Notodonta unicornis Harr., Cat. Ins. Mass. p. 73.* (1835).
Rt. Ins. Mass. p. 307. (1841).
Edema unicornis Walk., List. Lep. Br. Mus. V. (1855).
Morris, Synopsis Lep. N. Amer. p. 241. (1862).

"Cambridge, Aug. and Sept." (Harris Coll.) "Brookline, May." (Shurtleff.) Mass. (Sanborn, Mrs. Bridgham.) N. Y. (Grote.) Maine.

Cœlodasys Edmandsii n. sp.

♂. Somewhat olivaceous ashen, thorax dark above. No discal dot, but that region is slightly discolored. The outer transverse straight line composed of reddish lunules, lined within with white scallops is very distinct. Apical region white, margined below with a reddish streak. Three dark costo-apical dots, of which the outer one is parallel to one removed towards the middle of the wing. The internal angle of the wing is enclosed by a curved series of dark dots.

Secondaries pale, whitish beneath. Legs annulated with white.

Length of body, .55; exp. wings, 1.20 inch.

Cambridge, (Miss Edmands.)

This species is closely related to *C. unicornis*, but it is smaller, the fore wings are narrower in proportion, and the apex is more produced; likewise the internal angle is more rounded, and the outer margin is more oblique. The slender abdomen is a little more acute. It wants also the distinct linear discal dot of *C. unicornis*. Within, the wings do not seem to be crossed by waved lines, and the geminate costo-apical spots are much smaller, while it wants the dark transverse thoracic line present in *C. unicornis*.

Respectfully dedicated to Miss A. M. Edmands, of Cambridge.

Cœlodasys biguttatus n. sp.

Head gray, vertical tuft above black. Thorax reddish-brown, patagia blackish above. No distinct line on the prothorax. Primaries reddish brown, nervules black. Base of the costa dark, beyond cinereous with brown scales along the edge, which become indistinct waved lines continued across the wing and are more oblique beyond the discal dot. The linear reddish discal dot is surrounded by gray, and below and beyond is a dark rather broad discoloration curved around it. Beyond this the black nervules are interrupted by gray scales. There are two obscure series of reddish dots near the margin in the interspaces. Opposite the outer series of these spots the fringe, otherwise ferruginous, is of a dirty white.

Secondaries white, discolored with smoky at inner angle. The large tuft beneath the head is lilac-ashen.

Beneath, the fore-wings are white, smoky in the middle. Costo-apical dots distinct. Fringe white, black at the ends of the nervules, at the base are white dots in the interspace. Secondaries entirely white, except the dusky spot on the inner angle.

Legs ashen, ends of the scales dark, tarsi broadly annulated with dark. Abdomen slender, whitish, a narrow mesial line beneath.

In the female the markings are more distinct. The two series of ferruginous waved lines on each side of the median region are more distinct. The submarginal ferruginous region is more broken up by ashen scales. The secondaries and abdomen above smoky. There are faint traces of a slight mesial fascia across the wing. Beneath both wings are dark smoky. A light ferruginous line on the abdomen, which is itself larger than in the other species.

Length of body, ♂ .90, ♀ .95; exp. wings ♂ 1.60, ♀ 1.80 inch.

"Cambridge, July and Aug." (Harris Coll.).

Cœlodasys Harrisii n. sp.

♂. Cinereous. Head, pectus and front of thorax uniform ashen. Palpi dark above. Fore wings crossed by two series of obscure dark waved lines. Discal spot very narrow, linear, surrounded by a light ashen square space. On the outer margin of the wing is a row of dark dots in the interspaces, edged within with cinereous scales. Fringe concolorous. Secondaries smoky ashen, slightly discolored on the internal angle.

Beneath the fore wings are smoky cinereous, and on the costa are four alternate light and dark spots. Fringe dark on the termination of the nervules. Hind wings lighter. Abdomen a little lighter beneath than above, with no mesial line, and the anal tuft is deeply bifid.

Length of body, .90; exp. wings 1.55—1.70 inch.

Mass., (Harris Coll.) New York, (Grote.)

Cœlodasys cinereo-frons n. sp.

♀. Cinereous and blackish brown. Costa cinereous beyond the base of the fore wings. Vertical tuft dark above. Sides of the thorax blackish brown. The ashen costa of the primaries widens towards the middle of the wing, with a few dark scales. The remainder of the wing is of an uniform blackish brown, except below the internal nervure, which is fusco-cinereous, slightly spreading out towards the cinereous costa. Discal spot large oval, light cinereous. A submarginal row of fusco-cinerous dots. Fringe reddish ashen on the nervules.

Secondaries smoky, darker without; two light spots on the internal angle.

Beneath, the wings are smoky, but lighter towards the outer margin. Fringe blackish, interrupted without by lighter spots. A slight reddish line on the underside of the abdomen.

Length of body, .85; exp. wings, 1.80 inch.

"Cambridge, June 16," Harris. (Harris Coll.)

XYLINODES nov. gen.

♂. Head prominent, front subtriangular, a vertical porrect tuft. The palpi are short and stout, porrect, hardly reaching the front, tips obtuse; beneath clothed with short scales. Antennæ rather broadly pectinated to the outer third, branches long stout, tipped with ciliæ. Thorax moderately stout, scales of the pronotem distinct, not crested above, beneath very densely pilose, with a long pectoral tuft. Fore wings long and narrow, being a little more than one-third as broad as long. Costa straight, outer margin very long, internal angle rounded, and a little within the inner margin is a prominent tuft of dark scales. The 2d and 3d subcostal nervules are closely approximate, intercostal spaces very narrow, linear. The 4th subcostal arises within the middle of the intercostal space. The upper discal nervure is curved somewhat obliquely inwards to the origin of the 5th s. c., thence very obliquely and straight to the middle of the discal space, where it meets the lower discal which is thrown off at right angles to its nervure, and upon this nervule the discal fold terminates in a fork. The upper branch of the 3rd s. c. is very short and proceeds straight to the costa.

Costa of the hind wings bent down somewhat at the apex. Outer margin oblique, not very full, bent slightly on the first median interspace. Legs very hairy, fore tibiæ very pilose, presenting a flat expansion on the outer side; middle and hind tibiæ with two long sharp nearly equal spurs. Abdomen long and cylindrical; tip square, hardly tufted.

In its coloration and style of markings the only species of this genus yet known is gray, with darker longitudinal streaks and slashes. It is more streaked than any member of this subfamily, and from this character and the resemblance it bears to Xylina in its style of coloration, as well as its elongated wings and general appearance, the generic name has been selected.

This genus seems to be the connecting link between Cœlodasys and allies and Heterocampa, Lochmæus and other closely related genera. It differs from Heterocampa in its narrow wings, straight costa and angular hind wings, and in possessing a tuft on the fore wings. Indeed, the short stout palpi and strong pectinations, the very distinctly scaled pronotal pieces and the tufted primaries, together with the densely pilose sternum, will prevent the genus from being confounded with any of its allies.

Xylinodes virgata nov. sp.

♂. Pale cinereous. Pronotal pieces discolored with ligneous brown. A broad median thoracic dusky line, succeeded on the abdomen by a dark spot. Primaries light ashen with brown scales arranged in streaks, which on the costa proceed obliquely towards the outer margin, ending upon the subcostal nervure. Towards the apex are two distinct brown streaks, which are parallel to the costa; between and below the second streak are two whitish streaks. A dark brown discal dot is placed upon the lower discal nervule, and beyond it is a brown streak. In the middle of the discal space is a light line which passes over the discal dot and continues along the lowest subcostal interspace to near the outer margin. Below the median the wing is slightly tinged with ochreous. Just below the basal portion of the median nervure is a brown streak, and the internal border is mottled and streaked with dark cinereous. The tuft is dark brown, and the outer edge of the wing is also darker than the discal portion. There are no transverse streaks.

Secondaries white, the costa disclosed slightly with cinereous. Abdomen nearly concolorous, being a shade darker than the hind wings. Beneath cinereous, with a distinct median black line. Tarsi broadly annulated with dark.

Length of body, .85; exp. wings, 1.75 inch.

Cambridge, (Mr. A. Hyatt.) ♀ Lansing, Mich., (Prof. Miles.)
Seekonk, R. I., (Mrs. Bridgham's Coll.)

HETEROCAMPA Doubleday.

Heterocampa Astarte Doubleday.
Heterocampa astarte Doubl., Entomologist. p. 57. (1841).
Walk., Cat. Lep. Br. Mus. V. (1855).
Morris, Synopsis Lep. N. Amer. p. 240. (1862).
" Florida," (Doubleday.)

Heterocampa umbrata Walk.
Heterocampa umbrata Walk., Cat. Lep. Br. Mus. V. (1855).
Morris, Synopsis Lep. N. Amer. p. 240. (1862).
" Florida," (Doubleday.)

Heterocampa varia Walk.
Heterocampa varia Walk., Cat. Br. Mus. V. (1855).
Morris, Synopsis Lep. N. Amer. p. 240. (1862).
New York, (Walker.)

Heterocampa subalbicans Grote.
Heterocampa subalbicans Grote, Proc. Ent. Soc. Phil. p. 336. pl. 8. fig. 2. (1863).
Penn., (Coll. Ent. Soc.)

Heterocampa semiplaga Walk., Can. Nat. & Geol. (1861).
Morris, Synopsis Lep. N. Amer. p. 336. (1862).
Canada, (D'Urban.)

Heterocampa obliqua.

♂. Dark brown, with darker streaks and lines, margined with reddish, and large oblique costo-apical white patch.

Head pectoral tuft and thorax cinereous, except the black edges of the shoulder tippets and the posterior margin of the thorax. Primaries of an uniform dark ashen brown. The basal half of the wing is crossed by three interrupted lines, composed of linear black slightly curved lines or lunules, margined on both sides with ferruginous ashen. The first or basal line is straight, and reaches only to the base of the internal angle, which is black. The middle line is double, composed of two parallel linear sinuate lines, which become obsolete on the costa, and absent on the inner margin. The third line is single, and consists of the curvilinear black discal dot, and a second curvilinear line below the 4th median nervule. On the costa it is represented by two parallel brown lines, enclosing a white spot. Outside and parallel to the discal curvilinear spot is a line composed of two curvilinear lunules, which are geminate, and enclose a reddish brown line. From the upper line extends towards the apex a very distinct white patch, dusted over with ochreous scales. On its outer edge are three black internervular streaks, bathed with ferruginous scales. In the middle of the wing and just below is a round rusty patch. Below the median nervure and its branches the wing is lighter, and, like the costa, covered with cinereous and dark ochreous scales.

Secondaries pearly white, base of the fringe dark; a dark discoloration on the internal angle; costa dark. Beneath the primaries are dark, except in the middle portion, which is very pale. White and dark dots on the costal edge, and the costo-apical white patch appears through. Secondaries white, fringe discolored on the nervules.

Length of body, .85; exp. wings, 1.60 inch.

New York, (Grote.)

Heterocampa Trouvelotii n. sp.

♀.. This fine species, which is of larger size than usual, is of an ashen color, with an olive tinge. The head is pale, and the thorax gradually grows darker until on the scutellum it is almost black. On the olive cinereous primaries is a sub-basal double black line which only reaches the subcostal nervure; just beyond its middle it is pointed inwards. At the base of the wing the submedian and internal nervures are covered with black scales, forming a fork, the upper prong of which meets the transverse geminate line. A short basal geminate brown line extends from the costa to the black fork. Beyond and just within the sub-basal line are three brown patches, especially marked in the submedian and internal interspaces. The middle of the wing is clear olive gray. The discal dot forms a long curved linear lunate line, and beyond it the extra discal interspace is tawny brown. The discal line below is connected with three black lines; the two upper of which are the black upper median nervules, while the lower forms the first and longest of a series of submarginal longitudinal black streaks. Of these there are two in the extra-discal interspace, and two other one-third as long near the apex. Beyond is a submarginal clear olive gray space, bounded without by a very distinct black marginal line. Beyond is a similar narrow clear space next the gray fringe, which is brown at the ends of the nervules. In the apex of the wing is a single linear dot. Secondaries smoky gray, darker without, with a very slight diffuse middle line.

Beneath uniform cinereous, while the middle of the primaries is smoky gray, the costa and outer edge gray. The submarginal longitudinal lines reappear below, as does the marginal, while the fringe is dark cinereous, paler at the base. On the paler secondaries the mesial dark line is more distinct than above.

This species in its style of markings is near *H obliqua*, but much larger, olive gray instead of brownish gray; hence the markings are more distinct. The secondaries are smoky gray, while in *H. obliqua* they are white.

Length of body, .95; exp. wings, 2.12 inches.

Taken the last of July, at Medford, by M. L. Trouvelot.

LOCHMÆUS Doubleday.

Lochmæus Mantes Doubleday.

Lochmœus Mantes Doubleday, Entomologist. p. 58. (1841).
Walk., Cat. Br. Mus. V. p. 1029. (1855).
Morris, Synopsis Lep. N. Amer. p. 240. (1862).

"Trenton Falls, Georgia," Doubleday.

Lochmæus biundata.

Heterocampa biundata Walk., Cat. Lep. Br. Mus. V. (1855).
Drymonia mucorea H.-Sch., Lep. Exot. Sp. Nov. Fig. 514. (1856).
Heterocampa biundata Morris, Synopsis Lep. N. Amer. p. 240. (1862).

Mass., (Harr. Coll.) Boston, (Sanborn.) Seekonk, R. I., (Mrs. Bridgham.)

Lochmæus tessella n. sp.

Whitish ashen gray; head, prothorax and patagia being thus colored, while the rest of the thorax is darker cinereous, the abdomen being a little paler. The larger part of the fore wings is of a pale whitish ashen. concolorous with the head and prothorax. Nearly the basal third is of a darker cinereous than the hind part of the thorax, and this portion embraces three unequal black linear streaks: one extending along the subcostal, the middle one the largest and following the median, while the shorter one runs along the internal nervure. This region is bounded externally by a pale ashen line which begins on the basal third of the costa and runs obliquely inwards. It is twice zigzag before the subcostal, is bent more obtusely outward in the discal space, and again bends slowly outwards, and turns at a right angle to meet the dark streak on the internal nervule; hence it does not entirely cross the wing. The discal mark is a faint curvilinear line, succeeded below by a rather oblique very obscure cinereous lunated line. Upon the costa just beyond is a white spot, once zigzag on the costa, edged without with black. Beyond this spot are three minute dark dots, the inner of which is succeeded by a series of four large pale lunules margined on either side with cinereous, which end on the 3d median being in the 3d interspace replaced by a square conspicuous black spot, whose upper side is continued a little outwards, while on the opposite lower side is a supplementary linear dot in the next interspace. This spot is continuous with a submarginal oblique subapical zigzag pale line, dusky within, and bearing within three dark streaks in the middle of each interspace. Beyond this line the margin is dusky cinereous, with a marginal series of black linear lunates, interrupted by the nervules. Fringe dark cinereous.

Hind wings but little paler than the abdomen, with a rather distinct pale submarginal band. Base of fringe dark as are the nervules and outer margin of the wings. The only mark on them is a single oblique costal streak a little beyond the middle of the wing.

This species is rather above the medium size, and will be known by the pale ashen bleached primaries, the basal third of which is very dark cinereous. Also by the linear obscure discal line, succeeded on the costa by a white zigzag spot, and more especially by the square black spot near the internal angle which is isolated from the submargino-apical dusky line, of which it forms a part.

Length of body, ♀ .90; exp. wings, 2.15 inches.

Middle States, (Coll. Phil. Ent. Soc.)

Lochmæus olivata.

♂. Olive green cinereous, being greener at the base of the fore wings and more ashen externally. Head and thorax concolorous with the base of the primaries, but the palpi are much darker. Antennæ nearly concolorous with palpi. There are three transverse lines on the anterior wings straight in their course, and composed of regular lunules, each of which is pale cinereous margined externally with brown scales. The basal line is composed of but two lunules, one on each side of the base of the median nervule. The middle line situated on the basal third of the wing is composed below the submedian fold of two large lunules, more than twice as large as the remaining lunules. The third line is sinuate and obscure. Beyond is a fourth and submarginal line, slightly sinuate, and composed of internervular brown spots.

Secondaries whitish at base, becoming smoky externally and greenish ashen on the costa. Beneath, the body and wings are concolorous and of an uniform pale ashen, with a slight olivaceous hue, especially on the costæ.

Length of body, .90; exp. wings, 2.00 inches.

Brunswick, Me. Taken at light.

Lochmæus cinereus n. sp.

♂. Of a peculiar smoky cinereous, frosted with a few white scales, and characterized by the absence of any distinct markings. Head and thorax concolorous with the wings. Antennæ pale testaceous. Palpi brown on the sides, beneath very pale. The only transverse line present on the fore wings is a submarginal row of indistinct brown ashen internervular spots, margined broadly without with white. The places of three inner lines are indicated by three costal spots, very obscure, which are brown ashen, margined on each side with whitish scales. Of these the basal one is most distinct. The costal and inner edges of the wing are dusted more thickly with white scales than the outer and middle parts of the wing.

Secondaries smoky cinereous, especially on the costa, where is an abbreviated pale band, which does not reach the middle of the wing. Beneath whitish ashen, but a little darker on the costa of the primaries.

Length of body, .75; exp. wings, 1.80 inch.

Taken at light, at Brunswick, Me.

This species, while smaller than the preceding, differs structurally from it in having more slender and more thinly scaled palpi; the antennæ are not so heavily pectinated, and the wings are a little shorter and broader. The absence of any marking but the outer obscure band,

and its wanting any green tint, will easily separate this species from any other known to me.

Lochmæus unicolor n. sp.

♂. Of an uniform pale cinereous, with a faint greenish tinge, without any bands or spots. Costa very straight. A faint series of pale longitudinal lines situated on the nervules, crosses the primaries near the base of the nervules. Besides these linear spots there are no other markings on the wings, nor is any one portion of the wing darker than any other. The head, palpi and pectus, and under side of the body is a very pale argillaceous. The secondaries are a little darker above.

The moth has a faded *passé* look that is quite characteristic, and will distinguish it from its allies.

Length of body, .85; exp. wings, 1.85 inch.

Seekonk, R. I., where it has occurred more frequently than any other species. (Coll. Mrs. Bridgham.) Cambridge, (Coll. Dr. Harris.)

Lochmæus marina n. sp.

Pale sea green, dusted very minutely with ashen scales. Nervules slightly cinereous. On the outer third of primaries is a rather irregular curved series of dark dots, bordered externally with white. The end of the nervules are dark.

Secondaries pale cinereous, one straight mesial obscure dark spot.

Beneath, pale; body and both wings almost white; the latter are crossed by a dusky line.

Exp. wings, 1.60 inch.

Seekonk, R. I., (Coll. Mrs. Bridgham.)

PLATYCERURA* nov. gen.

Head large and prominent, twice as large as in *Cerura*; front scutellate, broad between the antennæ, while the sides are more parallel than in *Cerura*. Scales short and fine. Palpi short, a little depressed, not reaching the front, compressed and slender; the 3rd joint short, obtuse. Antennæ longer than in *Cerura*, very narrowly pectinated; joints longest in the middle, but slowly decreasing in length towards the tip, which is almost simple. Thorax stouter than usual, no "collar" or transverse lines.

Primaries short broad triangular, half as long as broad. Costa straight, curved down more than usual at the obtuse apex; outer edge short and not so full as usual; inner angle much more rectangular than usual, while the inner edge of the wing is very nearly straight, though not much longer than the outer edge.

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*πλατύς broad, Cerura.

The 1st subcostal is placed much within the middle of the wing. There is an intercostal space. 2nd s. c. arises just within the origin of the 3th s. c. The apical interspace is of the size of that in Cerura, while it is, owing to the curved nervules enclosing it, semiovate and not triangular as in Cerura. The 4th and 5th s. c. are short and straight. The 1st median nervule instead of being an independent as in Cerura, is curved downwards at base, and united with its main nervure, and the 4th median is straight.

Secondaries short and rounded, apex very obtuse. They reach to the outer fourth of the abdomen. Thus it is much shorter and broader than in Cerura. The apical interspace is long, much as usual.

The abdomen tapers rapidly, contracting rapidly before the tip, which is well tufted. Legs much as in Cerura.

In color the single species known is light gray, crossed by a basal dark straight line, and an outer dark line which widely forks upon the median nervure so as to enclose a square space.

The broad triangular fore wings, orbicular secondaries, and large broad closely cropped front, the short acute abdomen, and long pectinated antennæ distinguish this genus from *Harpyia* of Europe, which it somewhat approaches.

Platycerura furcilla n. sp.

♂. Ashen white, dusted with fine dark scales. The primaries are crossed by a twice angulated basal black line, within which at the insertion of the wing is a short basal spot. A second straight line crosses the wing just before its middle, and from it branches at nearly right angles a line which becomes straight above the 2nd median nervule and parallel to the inner line, thus enclosing a large square area which is concolorous with the rest of the wing. There is a submarginal obscure line shaded with white externally, which is irregularly zigzag, and runs down more than usual in the 2nd median interspace towards the margin of tne wing.

Secondaries whitish, especially on the outer border, with a broad obscure dusky submarginal line. The abdominal segments are annulated above with white, paler beneath. The fore wings are beneath dusky, the transverse dark lines appear through, the submarginal line being especially conspicuous, beyond which the margin is much paler. The secondaries are crossed by two obsolete bands, near the middle of which the inner one is more distinct upon the costa, corresponding to an inner costal spot.

Length of body, .65; exp. wings, 1.50 inch.

Mass., (Coll. Dr. Harris, Mr. Sanborn.)

CERURA Schrank.

Cerura borealis Harris.

Phalæna furcula Smith, N. H. Lep. Ins. Ga. p. 143. Tab. 72. (1797).
Dicranura borealis Boisd., Guérin, Icon. Griffith's Edit. Cuvier, Regne Animal.
Cerura borealis Harris, Rt. Ins. Mass. p. 306. (1841).
Cerura bifida var? Walk., Cat. Lep. Br. Mus. V. (1855).
Cerura borealis Morris, Synopsis Lep. N. Amer. p. 238. (1862).

Cambridge, (Coll. Harris.) Boston, (Sanborn.) Seekonk, R. I., (Coll. Mrs. Bridgham.) New York, (Grote.)

DESIDERATA.

Drymonia dimidiata H.-Sch., Lep. Exot. Sp. Nov. p. 66, fig. 515. (1856).
Gluphisia? septentionalis Walk., Cat. Lep. Br. Mus. V. (1855).

"Hudson's Bay," (Walker.)

Ichthyura apicalis Walk., Cat. Lep. Br. Mus. V. (1855).

"Hudson's Bay," (Walker.)

Subfamily PLATYPTERICIDÆ Stephens.

PLATYPTERYX Laspeyres.

Platypteryx fabula Grote.

Platypteryx fabula Grote, Proc. Acad. Nat. Sc. Phil. p. 59. (1862).
Proc. Ent. Soc. Phil. Vol. 1, p. 346. Pl. 3, fig. 2. (1863).

New York, (Grote.)

Platypteryx genicula Grote.

Platypteryx genicula Grote, Proc. Acad. Nat. Sc. Phil. p. 59. (1862).
Proc. Ent. Soc. Phil. Vol. 1, p. 346. Pl. 3, fig. 3. (1863).

New York, (Grote.) Mass. (Coll. Dr. Harris.) Boston, (Sanborn.) Cambridge, (F. W. Putnam.)

EDAPTERYX* nov. gen.

The head of this delicate genus is smaller than in Platypteryx. There is a slight vertical tuft, and the front is much smaller and broader, and the sides are more excavated than in the preceding genus. Palpi small, weak, not reaching the front. Antennæ well pectinated, the branches being well developed in the female. Body more slender than usual. The fore wings in their general form closely resemble Platypteryx but are not so much produced towards the apex, which is broadly triangular. The outer margin is three-toothed, being deeply incised; the middle tooth is the largest of the three. In the secondaries the apex is much rounded; the outer margin angulated in the middle; and the inner angle which passes beyond the tip of the abdomen by a distance equal to a fourth of the length of the inner margin of the wing. is not so angular as is Platypteryx. The interspaces of the fore wings are narrower on the costal region and broader below than in the former genus; while the median interspaces are shorter. The median nervure is less curved where it throws off its nervules, than in the typical genus. Legs much as in Platypteryx.

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* Ἔδω eat, Πτέρυξ wing.

In its style of coloration the species may be known by the two oblique straight parallel lines crossing the fore wings, which are strigated transversely as in some Geometridæ, such as *Chœrodes* and allies.

This fragile and very slender bodied genus can at once be distinguished from Platypteryx by the deep serrations of the outer edge of the fore wings. It also differs in the broader front of the head, smaller palpi and shorter pectinations of the antennæ.

I have seen but one female specimen from which to make this description.

Edapteryx bilineata n. sp.

♀. A delicate thinly scaled species of an ochreous silvery color; the ochreous scales appearing along the outer border, and lining the transverse lines. These two lines are in the middle of the wing, the outer being a little flexuous; both are dark, the inner one lined within and the outer one lined externally with ochreous. A distinct black discal spot. The fore wing is thickly covered with long transverse brown strigæ or short lines which become near the outer edge oblique and sinuate, forming an obscure submarginal line.

Secondaries paler and dusky perlaceous. Discal dot distinct and beyond is a transverse dark line once angulated opposite this spot. Beyond this line the wing is obscurely strigated.

Beneath, the fore wings are more yellowish towards the outer edge, and on the secondaries especially so beyond the outer line which, with the discal dot, is much plainer than on the upper surface. Head and body throughout concolorous with the fore wings.

Length of body ♀, .40; exp. wings 1.30 inch.

Boston, (Sanborn.) Medford, (Trouvelot.)

DRYOPTERIS Grote.

Dryopteris rosea Grote.

Drepana rosea Walk., Cat. Lep. Br. Mus. V. (1855).
Cilix americana H.-Sch., Lep. Exot. Sp. Nov. p. 60, fig. 470. (1856).
Drepana rosea Morris, Synopsis Lep. N. Amer. p. 219. (1862).
Dryopteris formula Grote, Proc. Acad. Nat. Sc. Phil. p. 60. (1862).
Dryopteris rosea Grote, Proc. Ent. Soc. Phil. Vol. 1, p. 345. Pl. 3, fig. 1. (1863).

Boston, (Harris Coll., Sanborn.)

Dryopteris marginata Grote.

Drepana marginata Walk., Cat. Lep. Br. Mus. V. (1855).
Morris, Synopsis Lep. N. Amer. p. 219. (1862).
Dryopteris marginata Grote, Proc. Ent. Soc. Phil. Vol. 1, p. 345. (1862).

Dryopteris irrorata n. sp.

This species is of a bright ferruginous or brick red, dusted above with brown abbreviated lines and dots, but beneath clear reddish.

Palpi and front of head of a bright rusty red, thorax and fore wings slightly shaded with brown. Both pairs of wings are marked nearly alike, being crossed by transverse irrorations which are united into lines near the base of the wing. Within the middle of the wing is a slightly curved irregularly zigzag dark line, which is deeply sinuate in the median space. On the outer fourth of the wing is a line of the same color, which makes an acute angle before reaching the apex of the wing, and then suddenly bends back upon the costa. Just beyond this line is a dark transverse streak which only touches the outer edge at the lower part of the apex, which is nearly black.

On the secondaries are two parallel dark somewhat zigzag lines, the inner being half as long as the outer one. Beneath, the outer line only is reproduced, being straight on the fore wings, but a little sinuate on the hind wings.

Length of body, .45; exp. wings, 1.40 inch.

Brunswick, Me., taken at light in August.

DESIDERATA.

Drepana fasciata Walk., Cat. Lep. Br. Mus. V. (1855).
Morris, Synopsis Lep. N. Amer. p. 218. (1862).
Drepana arcuata Walk., Cat. Lep. Br. Mus. V. (1855).
Morris, Synopsis Lep. N. Amer. p. 218. (1862).

"Nova Scotia," (Walker.)

Subfamily BOMBYCINÆ Westwood.

This small group which is not represented in this country, was by Westwood considered as a family. The family termination has been changed for a subfamily ending in accordance with our views as to the rank of this group. Bombyx mori is the typical genus. The group is represented in Europe by *Endromis versicolora* as there is abundant proof in characters drawn from the larva and perfect insect that these two genera are very closely related. *Aglia tau* is by Mr. Stainton (Manual of British Butterflies and Moths,) placed in the group "Endromidæ" with Endromis. *Aglia* should rather be placed among the the true *Attici* near *Telea*. It is however a lower form than that genus even, as I have satisfied myself from the study of the moth, and an examination of the plates in Godardt & Duponchel illustrating the transformations of *A. tau*.

Subfamily ATTACI Linnæus.

Linnæus in the *Systema Naturæ* recognized a group of species corresponding to this subfamily under the name of "*Attaci*."

TELEA Hübner.

Telea Polyphemus Hübner.
Phalæna (Attacus) Polyphemus Linn., Syst. Nat. (1767).
Fabricius. (1770).
Phalæna Polyphemus Smith, N. H. Lep. Ins. Ga. p. 93. Tab. 47. (1797).
Telea Polypheme Hübn., Samml. Exot. Schm. Bd. 2, pl. 172, 173. (1806).
Verz. p. 154. (1816).
Attacus Polyphemus Harr., Cat. Ins. Mass. p. 72. (1835).
Rt. Ins. Mass. p. 279. (1841).
Third edit. fig. 181. (1862).
Telea Polyphemus Walk., Cat. Lep. Br. Mus. V. (1855).
Hyalophora Polyphemus Fitch, Third Rt. Nox. Ins. N. York. p. 137. (1856).
Attacus Polyphemus Morris, Synopsis Lep. N. Amer. p. 226. (1862).

Maine, southward, (Coll. Dr. Harris, Sanborn, Shurtleff.)

TROPÆA Hübner.

Tropæa Luna Hübner.
Phalæna (*Attacus*) *Luna* Linn., Syst. Nat. (1767).
Drury, Illustr. p. 49. Pl. 24, fig. 1. (1770).
Fabricius. (1770).
Phalæna Luna Smith, N. H. Lep. Ins. Ga. p. 95. Tab. 48. (1797).
Tropæa Luna Hübn., Samml. Exot. Schm. II. pl. 169, 170, 171. (1806).
Verz. p. 152. (1816).
Attacus Luna Harris, Cat. Ins. Mass. p. 72. Rt. Ins. Mass. p. 277. (1841).
Third edit. fig. 179. *Cocoon* fig. 180. (1862).
Actias Luna Westw., Edit. Drury, p. 45. (1837).
Tropæa Luna Walk., Cat. Lep. Br. Mus. VI. (1855).
Actias Luna Fitch, Third Rt. Nox. Ins. N. York, p. 134. (1856).
Attacus Lana Morris, Synopsis Lep. N. Amer. p. 225. (1862).

Maine, southward, (Coll. Dr. Harris, Sanborn. Shurtleff.)

CALLOSAMIA nov. gen.

Front of the head narrow compared with *Samia*, and not so hairy. Antennæ broadly pectinated, in ♀ two-thirds as broad as in ♂. Mandibles obsolete. Maxillæ very short. Mentum and labrum coalesced, short and rounded in front, bearing the small short depressed cylindrical clavate palpi, which are thinly clothed with long scales. Fore wings more than twice the length of the whole body, falcate. Hind wings much produced at the anal angle. The first median nervule in the primaries subdivides a little beyond its origin.

I should here state that soon after beginning my studies upon this family, Professor Agassiz indicated to me that *S. promethea* should form the type of a separate genus from *Samia*.

Differs from *Samia* in its slighter form, more falcate primaries, in having the hind wings much longer behind, while in the middle of the wings are partially transparent triangular spots.

Callosamia Promethea.
Phalæna (*Attacus*) *Promethea* Drury, Illustr. p. 21. Pl. 12, fig. 1, 2. (1773).
Phalæna Promethea Smith, N. H. Lep. Ins. Ga. p. 91. Tab. 46. (1797).
Samia Promethea Hübn., Verz. (1816).
Geyer, Cont. Hübner, Samml. Pl. 2, fig. 3, 4. (1832).
Attacus Promethea Harris, Cat. Ins. Mass. p. 72. (1835).
Rt. Ins. Mass. p. 281. (1841).
Third edit. fig. 186 ♂, 187 ♀. (1862).
Saturnia Promethea Westw., Edit. Drury, Illustr. p. 20. Pl. 12, fig. 1, 2. (1837).
Hyalophora Promethea Duncan, Nat. Libr. xxxii. p. 134. Pl. 12. (1852).
Samia Promethea Walk., Cat. Lep. Br. Mus. V. (1855).

Attacus Promethea Fitch, Third Rt. Nox. Ins. N. York, p. 59. (1856).
Morris, Synopsis Lep. N. Amer. p. 224. (1862).

Mass., southward. (Coll. Dr. Harris, Sanborn, Shurtleff, Weidermeyer.)

Callosamia angulifera.
Samia angulifera Walk., Cat. Lep. Br. Mus. V. (1855).
Morris, Synopsis Lep. N. Amer. p. 227. (1862).

New York, (Grote.)

SAMIA Hübner.

Samia Cecropia Hübner.
Phalæna (Attacus) Cecropia Linn., Syst. Nat. (1767).
Fabricius. (1770).
Phalæna Cecropia Smith, N. H. Lep. Ins. Ga. p. 89. Tab. 45. (1797).
Samia Cecropia Hübn., Verz. p. 156. (1816).
Attacus Cecropia Harr., Cat. Ins. Mass. p. 72. (1835).
Rt. Ins. Mass. p. 279. (1841).
Third edit. p. 385. Fig. 182. Fig. 183 *larva*. 184 *cocoon*. 185 *pupa*. (1862).
(No name.) Thompson, Nat. Hist. Vermont, p. 171. Moth, larva and pupa figured. (1842).
Hyalophora Cecropia Duncan, Nat. Libr. xxxii. p. 132. Pl. 11. (1852).
Samia Cecropia Walk., Cat. Lep. Br. Mus. V. (1855).
Attacus Cecropia Fitch, Third Rt. Nox. Ins. N. York, p. 363. (1856).
Morris, Synopsis Lep. N. Amer. p. 223. (1862).

Maine, southward. (Harris Coll., Sanborn, Shurtleff.)

Samia Columbia Smith.
Samia Columbia Smith, Proc. Bost. Soc. Nat. Hist. (1864).

This beautiful and rare species has been detected in Norway, Maine, by Mr. S. J. Smith of that town. It has been shown by Mr. Smith that the species though closely allied to *S. Cecropia*, yet differs from it in all its stages. It feeds upon the *Rhodora canadensis*, spinning its large cocoon upon the terminal twigs of that shrub.

Samia Euryale.
Saturnia Euryale Boisduval.

"California."

Where Boisduval described or mentions this species I have been unable to ascertain. A notice of its occurrence is to be found in the Proceedings of the California Academy of Sciences, Vol. I.

Attacus aurota (Cramer sp.) I have received from Mr. Uhler. It was taken in Texas, and the specimen was in too poor condition to serve for description. It evidently forms the type of a new genus, and whether it is the true "Aurota" figured by Cramer remains to be proved.

Under the name of Phalæna Attacus Cecropia, Polyphemus and Promethea, Cramer has figured forms found in the West Indies. Until specimens are received from that quarter it would not be safe to quote his names as synonymes of our more northern species. His figures would lead one to suppose that they were distinct species.

Attacus splendida Clemens, Proc. Acad. Nat. Sc. Phil. p. 160. (1860).
Morris, Synopsis Lep. N. Amer. p. 228. (1862).
"*Bombyx splendida* De Beauvois, Ins. en Afrique et en Amer. p. 133. Pl. 22, fig. 1, 2."

I have been unable to see the figure and description of this species, as the single copy of the work above referred to is incomplete, wanting that plate and text.

"*Attacus Didyma* Beauv., Ins. Afriq. et Amer. Pl. 20."
Morris, Synopsis Lep. N. Amer. p. 228. (1862).

The genus Attacus was by Hübner restricted to the immense *A. Atlas* and another species of China. It is doubtful whether any species of Attacus exists in America.

Subfamily CERATOCAMPADÆ Harris.

CITHERONIA Hübner.

Citheronia regalis Hübner.
Bombyx regalis Fabricius.
Phalœna regia Smith, N. H. Lep. Ins. Ga. p. 121. Tab. 61. (1797).
Citheronia regia Hübn., Verz. p. 153. (1816).
Ceratocampa (Ceracampa Kirby) *regalis* Harr. Cat. Ins. Mass. p. 72. (1835).
Rt. Ins. Mass. p. 287. (1841).
3rd Ed. fig. 194. 195 *larva.* (1862).
Dorycampa regalis Duncan, Nat. Libr. xxxii. p. 161. pl. 18. (1845).
Ceratocampa regalis Morris, Synopsis Lep. N. Amer. p. 229. (1862).

Mass., southward, (Coll. Dr. Harris, Sanborn.)

This is exceedingly rare in Massachusetts.

EACLES Hübner.

Eacles imperialis Hübner.
Bombyx imperialis Drury, I. p. 17. pl. 9. figs. 1, 2. (1770).
Bombyx imperialis Fabricius.

Bombyx Laocoon Stoll, Sup. to Cramer. p. 179. Pl. 42. fig. 2. (1787).
Phalæna imperatoria Smith, N. H. Lep. Ins. Ga. p. 109. Tab. 55. (1797).
Eacles imperatoria Hübn., Verz. p. 153. (1816).
Ceratocampa imperialis Harr., Cat. Ins. Mass. p. 72. (1835).
Westw. Edit. Drury, I. p. 17. Pl. 9. figs. 1, 2. (1837).
Dryocampa imperialis Harr., Rt. Ins. Mass. p. 290. (1841).
Third Edit. fig. 196. 197 *larva.* (1862).
Duncan, Nat. Libr. xxxii. p. 158. Pl. 17. fig. 1. (1845).
Morris, Synopsis Lep. N. Amer. p. 230. (1862).

Mass., (Coll. Harris.) Mrs. Bridgham has taken several of the larvæ from the white pine at Seekonk, R. I., early in September.

EUCHRONIA* nov. gen.

Front of the head broadly subtriangular, spreading pilose. Joints of the antennæ short, a little serrated beneath, with broad pectinations, each joint being provided with two pairs of pectinations, of which the second is nearly obsolete. Eyes small, sunken. Foramina large and conspicuous when the head is denuded. Mandibles obsolete, represented by a slight elevated line curving inwards towards the narrow linear mouth. The maxillæ form the membranous ridges diverging from the under side of the mouth. Mentum and labium obsolete. The palpi consist of two small elongated cylindrical tubercles, with a few long scattered scales. Thorax short and round. Fore wings scarcely longer than the body, one-half as long as broad; costal margin straight, rounding at the apex; outer margin very oblique. 3rd and 4th subcostal nervules arise farther out than the 1st median, and the discal area is produced outward at their origin, and made narrower by the angulated base of the 1st median.

Secondaries reach nearly to the tip of the outer margin. Discal nervules situated beyond the middle of the wing; the subcostal and median nervules being short. Wings sparsely covered with narrow subtriangular scales, laid on more thickly at the base and along the costa of the wings, while the middle area is partially translucent. An irregular dark patch surrounds the narrow linear transparent discal region. An irregular light translucent broad mesial band crosses both wings alike. The fore tibiæ are densely pilose. Tarsi thickly spined beneath; ungues long and slender.

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* Ἐυ, Κρόνος Saturn.

This genus is so distinct from its allies, that in this place farther proof drawn from larval characters and the head of the imago, which I have entered in my notes, is unnecessary. The term Saturnia Schrank should be retained for the European *Saturnia cæcigena*, *spini*, *carpini* and *pyi*.

Euchronia Maia.

Bombyx Maia Drury, Illustr. II. p. 42. Pl. 24. fig. 3. (1773).
Proserphina Fabricius.
Phalæna Maia Smith, N. H. Lep. Ins. Ga. p. 99. Tab. 50. (1797).
Saturnia Maia Hübn., Verz. p. 157. (1816).
Saturnia Proserpina Harris, Cat. Ins. Mass. p. 72. (1835).
Saturnia Maia Harris, Rt. Ins. Mass. p. 285. (1841).
Third Edit. fig. 193. (1862).
Saturnia Maia Duncan, Nat. Libr. xxxii. p. 154. Pl. 16, fig. 1. (1845).
Hemileuca Maia Walk., Cat. Lep. Br. Mus. VI. (1855).
Saturnia Maia Morris, Synopsis Lep. N. Amer. p. 221. (1862).

Maine, New Hampshire, southward, (Coll. Harris, Sanborn, Shurtleff.) I have received a specimen of this species from Mr. S. J. Smith, of Norway, Me. It has also been taken at Gilmanton, N. H., by Mr. M. B. Blake.

HEMILEUCA Walker.

Hemileuca eglanterina Walker.

Saturnia eglanterina Boisd., Lep. Cal. Ann. Soc. Ent. France, p. 51. (1852).
Hemileuca eglanterina Walk., Cat. Lep. Br. Mus. VI. (1855).
Telea eglanterina H.-Sch. Lep. Exot. Nov. Sp. p. 10. fig. 445. (1855).
Saturnia eglanterina Morris, Synopsis Lep. N. Amer. p. 222. (1862).

"California," Boisd.

Hemileuca Hera.

Saturnia Hera Harris, Rt. Ins. Mass. p. 286. (1841).
Morris, Synopsis Lep. N. Amer. p. 221. (1862).

According to Dr. Harris, this species was taken by Mr. Nuttall, near the Rocky Mountains. It is figured by Audubon, Birds of America, Pl. 359.

Hemileuca pica Walker.

Hemileuca pica Walk., Cat. Lep. Br. Mus. VI. (1855).
Saturnia pica Morris, Synopsis Lep. N. Amer. p. 222. (1862).

DESIDERATA.

Saturnia galbina Clem., Proc. Acad. Nat. Sc. Phil. p. 156. (1860).
Morris, Synopsis Lep. N. Amer. p. 222. (1862).

"Texas," (Clem.)

———————? *megæra* Fab. Syst. Ent. III. 1.
Walk., Cat. Lep. Br. Mus. VI. (1855).
Morris, Synopsis Lep. N. Amer. p. 222. (1862).

HYPERCHIRIA Hübner.

Hyperchiria varia Walker.
Phalæna Io Smith, N. H. Lep. Ins. Ga. p. 97. Tab. 49. (1797).
Hyperchiria Io Hübn. Verz. p. 157. (1816).
Saturnia Io Harr., Cat. Ins. Mass. (1835).
Hyperchiria Io Geyer. Forts. Hübn., Samml. Exot. Schm. III. Pl. 17. figs. 1—4. (1837).
Saturnia Io Harr., Rt. Ins. Mass. p. 284. (1841).
Third edit. figs. 191, 192. 188 *larva,* 190 *pupa,* 189 *cocoon.* (1862).
Aglia Io Duncan, Nat. Libr. xxxii. p. 156, Pl. 16. (1845).
Hyperchiria varia Walk., Cat. Lep. Br. Mus. VI. (1855).
Saturnia Io Fitch, Third Rt. Nox. Ins. N. Y. p. 61. (1856).
Morris, Synopsis Lep. N. Amer. p. 220. (1862).

Our species has been confounded by authors with Cramer's species *Io*. Mr. Walker has separated it under the name *H. varia*. Judging by Cramer's plate, his "Io" from South America belongs to a different genus, since the outer edge of the fore wings are scalloped, and the hind wings are narrower and longer than in *Hyperchiria*.

COLORADIA Blake.

Coloradia Pandora Blake.
Coloradia Pandora Blake, Proc. Ent. Soc. Phil. p. 279. Pl. 7. (Nov. 1863).

"Pike's Peak, Colorado Terr.," (Blake.)

DRYOCAMPA Harris.

Dryocampa rubicunda Harris.
Bombyx rubicunda Fabricius.
Dryocampa rubicunda Harris, Cat. Ins. Mass. p. 72. (1835).
Morris, Synopsis Lep. N. Amer. p. 232. (1862).
Anisota rubicunda Grote, Proc. Ent. Soc. Phil. p. 93. (June, 1864).

Mass., (Coll. Harris, Sanborn.) Maine.

Dryocampa bicolor Harris.
Dryocampa bicolor Harr., Rt. Ins. Mass. p. 293. (1841).
Morris, Synopsis Lep. N. Amer. p. 232. (1862).
Anisota bicolor Grote, Proc. Ent. Soc. Phil. p. 93. (June, 1864).

"North Carolina," (Harris.)

ANISOTA Hübner.

Anisota senatoria Hübner.
Phalæna senatoria Smith, N. H. Lep. Ins. Ga. p. 113. Tab. 57. (1797).
Anisota senatoria Hübn., Verz. p. 193. (1816).

Dryocampa senatoria Harris, Cat. Ins. Mass. p. 72. (1835).
Rt. Ins. Mass. p. 292. (1841).
Third edit. Fig. 200. 198 *larva*, 199 *pupa*. (1862).
Walk., Cat. Lep. Br. Mus. VI. (1855).
Fitch, Fifth Rt. Nox. Ins. N. York. p. 43. (1859).
Morris, Synopsis Lep. p. 231. (1862).
Anisota senatoria Grote, Proc. Ent. Soc. Phil. p. 93. (June, 1864).
Mass., (Coll. Harris, Sanborn, Shurtleff.) Cambr., (F. W. Putnam.)

Anisota stigma Hübner.
Bombyx stigma Fabricius.
Phalæna stigma Smith, N. H, Lep. Ins. Ga. p. 111. Tab. 56. (1797).
Anisota stigma Hübn., Verz. p. 193.
Geyer. Forts. Hübn., Samml. Exot. Schm. III. Pl. 26. fig. 1—4. (1837).
Dryocampa stigma Harris, Rt. Ins. Mass. p. 292. (1841).
Walk., Cat. Lep. Br. Mus. VI. (1855).
Fitch, Fifth Rt. Nox. Ins. N. York. p. 44. (1859).
Morris, Synopsis Lep. N. Amer. p. 231. (1862).
Anisota stigma Grote, Proc. Ent. Soc. Phil. p. 93. (June, 1864).
Mass., (Coll. Harris.)

Anisota pellucida Grote.
Phalæna pellucida Smith, N. H. Lep. Ins. Ga. p. 115. Tab. 58. (1797).
Dryocampa pellucida Harris, Rt. Ins. Mass. p. 293. (1841).
Fitch, Fifth Rt. Nox. Ins. N. York. p. 44. (1859).
Morris, Synopsis Lep. N. Amer. p. 232. (1862).
Anisota pellucida Grote, Proc. Ent. Soc. Phil. p. 93. (June, 1864).
Mass., (Coll. Harris, Sanborn.) N. York, (Grote.)

Anisota virginiensis.
Bombyx virginiensis Drury, Illustr. II. p. 23. Pl. 13, fig. 2. (1773).
Dryocampa virginiensis West. Edit. Drury. (1837).
Walk., Cat. Lep. Br. Mus. VI. (1855).
"Virginia," (Drury.) "Georgia," (Walk.)

Subfamily LACHNEIDES Hübner.

This group, called by most writers Bombycidæ, and by Duponchel in 1846, Lasiocampidæ, (in part,) corresponds to the *Lachneides Eutirchæ* (in part) and *Trichodæ* of Hübner in the "Verzeichniss." In restoring the name *Lachneides* of Hübner, I apply it to a group including all three of his "Strips" indicated above, and which, taken collectively, correspond to the Bombycidæ of those authors who conceived that *Bombyx mori* was the typical genus.

GASTROPACHA Ochsenheimer.

Gastropacha americana Harr.

Gastropacha americana Harr., Rt. Ins. Mass. p. 273. (1841).
Third edit. fig. 176. (1862).
Fitch, Third Rt. Nox. Ins. N. Y. pp. 19, 337, 380. (1856).
Gastropacha occidentalis Walk., Cat. Lep. Br. Mus. VI. (1855).
Gastropacha americana Morris, Synopsis Lep. N. Amer. p. 233. (1862).

Mass., (Coll. Harris, Sanborn.) Brunswick, Me. Captured the last of May, on the wing, by Mr. J. E. Dow.

Gastropacha ferruginea n. sp.

♀. A smaller species than *G. americana*, and which approaches closely Smith's *ilicifolia*, I have received from Prof. M. Miles of the Mich. Agricultural College at Lansing. It differs from *G. americana* in wanting any cinereous bands on the wings. They are throughout rusty brown. Like that species, however, the primaries are crossed by two dark lines, but they are much more distinct. and the inner one is deeply toothed on the discal space. The outer one is more oblique and more sinuate, and the space between the two branches is twice as broad; indeed, we can see that it is the linear discal dot which forms the inner shorter line, and that the outer branch terminates distinctly upon the costa, where in *G. americana* it is obsolete. There is no line or discoloration between this and the outer edge of the wing, which is less excavated, and the teeth are much finer and sharper than in the other species. The excavations are partially filled in with silvery white. There is but a single broad dark line crossing the hind wings and terminating at the outer edge of the basal largest excavation; beneath it does not become diffused as in *G. americana*. There is no ashen discoloration on the hind wings. The head and front of the thorax are cinereous as in the other species, and the body beneath is very similar. I have compared the females of both species.

Length of body, .62; length of fore wing, .80 inch.

Whether the *Phalæna ilicifolia* of Smith as figured by Abbot is identical with either of the above species, can only be determined when specimens are received from the Southern States.

TOLYPE Hübner.

Tolype Velleda Hübner.

Bombyx Velleda Stoll, Sup. to Cramer, Pap. Exot. p. 178. Pl. 41. fig. 4. (1787).
Phalæna Velleda Smith, N. H. Lep. Ins. Ga. p. 103. Tab. 52. (1797).

Gastropacha Velleda Harr., Cat. Ins. Mass. p. 72. (1835).
Rt. Ins. Mass. p. 273. (1841).
Third edit. fig. 177. 178, *larva*. (1862).
Planosa Velleda Fitch, Second Rt. Nox. Ins. N. York. p. 268. (1856).
Third Rt. Nox. Ins. N. York. p. 20. (1856).
Gastropacha Velleda Morris, Synopsis Lep. N. Amer. p. 234. (1862).

Mass., (Coll. Harris, Sanborn.) New York, (Grote.)

Tolype laricis.

Planosa laricis Fitch, Second Rt. Nox. Ins. N. Y. p. 262. Pl. 2. fig. 5, 6. (1856).
Gastropacha laricis Morris, Synopsis Lep. N. Amer. p. 234. (1862).

Mass. "From the pupa Sept. Mt. Auburn, N. H., Leonard." (Harr. Coll.)

CLISIOCAMPA.

Clisiocampa decipiens Walker.

Phalæna castrensis Smith, N. H. Lep. Ins. Ga. p. 119. Tab. 60. (1797).
Harris, Cat. Ins. Mass. p. 72. (1835).
Clisiocampa americana Harris, Rt. Mass. p. 269. (1841).
Third ed. Pl. 7. fig. 17 ♀, 18 ♂. fig. 13 *larva*, 15 *cocoon*, 16 *eggs*. (1862).
Clisiocampa decipiens Walk., Cat. Lep. Br. Mus. VI. (1855).
americana Fitch, Second Rt. Nox. Ins. N. Y. p. 181. Pl. 3. fig. 3 ♂ 4 ♀. (1856).
Morris, Synopsis Lep. N. Amer. p. 235. (1862).

Maine, southward.

Clisiocampa sylvatica Harr.

Phalæna neustria Smith, N. H. Lep. Ins. Ga. p. 117. Tab. 59. (1797).
Clisiocampa neustria Harr., Cat. Ins. Mass. p. 72. (1835).
sylvatica Harr., Rt. Ins. Mass. p. 271. (1841).
Third edit. Pl. 7, fig. 18 ♂. 19 *larva*. (1862).
Fitch, Second Rt. Nox. Ins. N. York. p. 198. (1856).
Fifth Rt. pp. 19, 40. (1859).
Morris, Synopsis Lep. N. Amer. p. 236. (1862).

Maine, southward.

Whether the *Bombyx americana* mentioned by Fabricius is identical with Harris' *americana* or not remains a question. At present Walker's name is retained over the name proposed by Dr. Harris.

Clisiocampa californica n. sp.

Cinnamon brown, with two transverse pale lines curved outward just before terminating upon the costa. Base of the primaries within the inner line is lighter than without. Secondaries darker than the primaries. Fringe of both wings broadly interrupted with pale brown. The female is lighter colored than the other sex, with two dark brown lines, the outer one continuing straight on to the costa. Beneath in both sexes uniformly darker than above.

Length of body, ♂ .55, ♀ .60; exp. wings, ♂ 1 inch, ♀ 1.20 inch.

It differs from *C. decipiens* in that the ♂ has the two transverse lines curved on the costal region. California, (Mr. Edwards.)

Subfamily HEPIALI Linnæus.

XYLEUTES Hübner.

Our species all belong to the above genus, which should be separated from Cossus. *C. ligniperda* of Europe is the type of the latter genus. This is a much more robust and heavy form than *Xyleutes*, the thorax is more globose, the head is more sunken, the wings are much broader and shorter, having the costa more convex, and the outer margin nearly straight, while the wings are more thickly scaled than in the American genus.

Xyleutes robiniæ Harris.

Cossus robiniæ Peck, Mass. Ag. Rep. and Journ. V. p. 67. Plate. (1818).
Harris, Cat. Ins. Mass. p. 72. (1835).
Walk., Cat. Lep. Br. Mus. VII. p. 1514. (1856).
Fitch, Fifth Rt. Nox. Ins. N. York. p. 4. (1859).
Morris, Synopsis Lep. N. Amer. p. 124. (1862).
Xyleutes robiniæ Harris, Rt. Ins. Mass. p. 297. (1841).
Third edit. fig. 205. 203 *larva*, 204 *cocoon*. (1862).

Mass., (Coll. Harris.) Brunswick, Me., larvæ and pupæ in the red oak.

(?) *Cossus robiniæ* Boisd., Lep. Cal. Ann. Ent. Soc. France. p. 49. (1852).
Walk., Cat. Lep. Br. Mus. VII. p. 1514. (1856).
H.-Sch., Lep. Exot. Sp. Nov. Fig. 170, 171. (1856–'58).

"California," Boisd.

Xyleutes crepera Harris.

Cossus crepera Harris, Cat. Ins. Mass. p. 72. (1835).

Primaries long and narrow; apex acute, much produced; outer margin very oblique; inner margin very convex at the base. Primaries mottled much as in *X. robiniæ*. The middle of the wing is darker, the clouded portion uniting and forming an oblique broad continuous band extending from the outer fourth of the inner margin to the apex, and breaking up above into two broad short bands extending upon the costa.

Secondaries distinctly triangular, apex acute, basal half of the wing and costa and subcostal region black, remaining portion yellow. The dark portion is continued down the inner margin and indentates the yellow outer half along and above the median nervure as far as the origin of its three first branches.

Outer margin dark. Beneath, the same as above.

Length of body, 1.15; exp. wings, 2.20 inches.

Mass., (Coll. Harr.)

Xyleutes querciperda.

Cossus querciperda Fitch, Fifth Rt. Nox. Ins. N. Y. p. 10. (1859).
Morris, Synopsis Lep. N. Amer. p. 125. (1862).

♂. Gray, being of the same color as *X. robiniæ*; the surface covered with an irregular net-work of dark lines differing in degrees of fineness, which are not gathered into spots and bands as in *X. robiniæ*. It resembles in this respect *Cossus ligniperda* of Europe, which it approaches more than either of the foregoing species in possessing shorter wings and a less oblique outer edge of the fore wings, but the net-work of fine lines are not arranged in transverse narrow lines as in *C. ligniperda*.

There is a submarginal row of lines which are a little larger and often connected into bands, throwing out forked branches in each interspace towards each edge.

Secondaries dull and dark, not much paler at the outer edge, concolorous with the abdomen.

Beneath the primaries are but a little more dusky than above; the hind wings are like the anterior pair, covered with a net-work of lines, which are wanting on the upper side, and are paler than above, while the costa is finely peppered with dark scales. Fringe spotted with black.

Length of body, 1 inch; exp. wings, 2.25 inches.

This species which I refer with some hesitancy to Dr. Fitch's *querciperda*, differs from *X. robiniæ* in the fuller more convex costa of the fore wings; the apex is not so much produced, the outer edge much shorter and not so oblique, thus making the inner edge much longer. It is also smaller.

Newburgh, New York, (Mr. Edwards.)

Xyleutes populi.

Cossus populi Walk., Cat. Lep. Br. Mus. VII. p. 1515. (1856).
Morris, Synopsis Lep. N. Amer. p. 124. (1862).

St. Martin's Falls, Albany River, Hudson's Bay, Barnston, (Walker.)

Xyleutus plagiatus.

Cossus plagiatus Walk., Cat. Lep. Br. Mus. VII. p. 1515. (1856).
Morris, Synopsis Lep. N. Amer. p. 124. (1862).

United States, Doubleday, (Walk.)

I find the following note in the Systematic List of Canadian Lepidoptera by W. S. M. D'Urban, Can. Nat. and Geol. Aug. 1860, p. 247..

" *Cossus plagiatus* Walk. Rare, July.

"In 1857, Mr. T. R. Peale, of the U. S. Patent Office, named this species *Cossus McMurtrici*, and informed me that it was common south of Pennsylvania, but rare in the Middle States."

ZEUZERA Fabricius.

Zeuzera canadensis Boisd.

Zeuzera canadensis H.-Sch., Lep. Exot. Sp. Nov. Fig. 166. (1854).
Walk., Cat. Lep. Br. Mus. VII. p. 1530. (1856).
Morris, Synopsis Lep. N. Amer. p. 125. (1862).

"Canada," (Boisd.)

Zeuzera pyrina Fabricius, Ent. Syst. III. 2, 5, 6.
Walk., Cat. Lep. Br. Mus. VII. p. 1530. (1856).

"North America," (Fabr.)

STHENOPIS nov. gen.

Head small, prominent, front longer than broad, narrowing a little anteriorly; scales of the front long pilose, thin. Palpi slender, reaching nearly to the front, thinly spreading scales; 3rd joint hardly distinguishable from the 2nd. Antennæ short filiform. Thorax short, subglobose scales much raised behind.

Primaries nearly half as broad as long; costa convex at base, and especially so towards the falcate apex, which is subacute; outer margin concave below; internal angle much rounded; inner edge full, convex. 2nd subcostal nervule subdivides within its middle, while in Hepialus it subdivides beyond its middle. 1st subcostal much curved beyond its middle, following the contour of the costa.

Secondaries reach a little beyond the middle of the abdomen; costa somewhat concave before the middle, beyond convex, apex produced acutely; outer margin not very full; wings broadest from the internal angle to the costa. In both wings the distance between the origins of the 4th median nervule and the submedian nervure, where it throws off the connecting branch, is less than the distance between the same nervule and the origin of the 3rd. The reverse of this occurs in Hepialus.

Legs broadly pilose, spreading on each side to the ungues. Hind tarsi closely scaled; ♂ tibiæ with a long broad oblong tuft, once wrinkled. Abdomen long, compressed, with a slight anal tuft.

This genus is readily distinguished from *Hepialus* not only by its greater size, but by important structural characters. The head is smaller and more free from the thorax; the wings are more falcate, with a fuller inner edge. The apex of the hind wings are more produced. Hepialus does not possess the large square tuft on the hind tibiæ, nor the elongated abdomen.

The wings are covered with broad irregular bands of silvery scales, which are more uniformly spread over the surface in *S. humuli* of Europe, which likewise belongs to this genus. This last named species has, with *G. Libania*, been placed by Hübner in his genus *Gorgopis*. But our species cannot be referred to this genus, as restricted by Walker to *Gorgopis Libania* Hübn. (Cramer sp.) and *G. caffra* Steph. (MSS.) which have, according to his description, (Cat. Lep. Br. Mus. VII. p. 1565) " long and slender palpi extending beyond the head; 3rd joint elongated," while the antennæ are deeply pectinated, and the secondaries reach a little beyond the tip of the abdomen. Also the costa of the primaries is straight and the outer border is but slightly oblique.

Our genus does not seem to extend to the tropics, but to be confined to the temperate zone of Europe and America, and on this continent its species are found on the confines of the subarctic regions in the Hudson's Bay Territory.

Sthenopis argenteomaculata.

Hepialus argenteomaculatus Harr., Cat. Ins. Mass. p. 72. (1835).
Rt. Ins. Mass. p. 295. (1841).
Third edit. fig. 410. (1862).
Gosse, Can. Nat. p. 248. (1840).
Agassiz, Lake Superior, p. 389. Pl. 7, fig. 6. (1854).
Walk., Cat. Lep. Br. Mus. VII. p. 1556. (1856).
Morris, Synopsis Lep. N. Amer. p. 123. (1862).
Gorgopis argenteomaculata Packard, Bost. Journ. Nat. Hist. p. 596. (1863).
Grote, Proc. Ent. Soc. p. 73. (April, 1864).

Lake Superior, (Coll. Harris. M. C. Z., Prof. L. Agassiz.) Saskatchewan, Scudder, (Coll. M. C. Z.) St. Martin's Falls, Albany River, Hudson's Bay, Barnston, (Walk.) " Canada West, Stevens," (Walk.) " Eastern Townships," (Gosse.) " Sorel," (D'Urban.)

The specimen collected by Mr. Scudder is a little smaller than the Lake Superior specimen; the two basal spots are narrow linear and much smaller; the wings are rather more ochreous, and the outer triangular spot at the end of the fourth marginal line is distinct, while in the Lake Superior specimen it is very obscure. Both specimens are females.

Sthenopis purpurascens n. sp.

Gorgopis purpurascens Pack., Bost. Journ. Nat. Hist. p. 598. (1863).

♀. Dark sable brown, with irregular bands of silvery purple. Head and body deep sable brown. Fore and hind wings of a purplish silvery hue. At the base of the discal space is a very distinct triangular silvery spot, and in the succeeding space is a more obscure linear spot. These are enclosed in a band of three large sable spots directed obliquely upon the internal angle, the marginal one being semi-ovate. From the origin of the median nervules proceeds a broad oblique band to a little beyond the middle of the costa; there being two unequal costal oblong spots before and at its middle.

The outer margin including the apex is brown. A submarginal purple silver line as in *S. argenteomaculata*, excavated within each interspace, especially in the disco-marginal one. A square detached portion of this band is isolated upon the costa just before its apex. Tarsi rubicund, tibiæ slightly tinged with roseate.

Beneath both wings are uniformly purplish, except upon the costa, as the markings on the fore wings hardly appear beneath, but there is a marginal row of purplish silver triangular spots.

Compared with the preceding species, the primaries are fuller towards the apex which is more obtuse, and the outer margin is hardly excavated beneath the apex, making the wings less falcate. The hind wings are larger, fuller and more rounded from the apex to the inner angle. It differs also in wanting any tawny tinge.

Length of body, 1.62; exp. wings, 4.20 inches.

Captured by Mr. S. H. Scudder, at the base of Mt. Washington.

Sthenopis quadriguttata.

Gorgopis quadriguttatus Grote, Pr. Ent. Soc. Phil. iii. p. 73. Pl. 1, f. 6. ♀. (1864).

" 'Great Slave Lake,' Mr. Ross," (Grote.)

Sthenopis argentata n. sp.

♂. Dark sable brown, fore wings obscurely silvery. Three distinct rather large sable costal spots, of which the costo-apical is the largest and semi-ovate, oblique, and edged with silver gray. At the base of the discal space is a tawny brown spot, margined without with silver and centered with a triangular silver spot. There are two similar tawny oval spots below, one situated at the base of the submedian space, contains an elongated angular silver spot; the other is distinctly oval, and destitute of any silver center. These two tawny spots form part of a median oblique band which narrows in width upon the first subcostal nervule, and below runs towards the internal angle, just beyond the middle of the inner edge of the wing. An inwardly curved line of silvered sable brown passes from the internal angle to the apex, enclosing a dark marginal region which contains three nearly straight silvery lines which are slightly interrupted upon the nervules, the outer one following the conteur of the border.

Secondaries darker than the primaries, some obscure silvery lines on the costa towards the apex. Ends of the nervules lighter than the rest of the wing. Beneath the wings are nearly concolorous with the upper side of the hind wings, the transverse line faintly reappearing on the fore wings.

Length of body, 1.20; exp. wings, 2.50 inches.

Taken on the low grounds behind the Museum Comp. Zoölogy, Cambridge, Mass., by Mr. C. A. Shurtleff. Also in Dr. Harris' collection.

Judging by Mr. Grote's figure of *S. quadriguttatus*, this superb species is smaller, the fore wings are more falcate, its colors are of a darker shade, and the two basal silver triangular spots on the fore wings are several times larger than in the species from the Great Slave Lake.

In the natural order the *S. humuli* of Europe would connect this genus with Hepialus, as it is smaller, and otherwise approaches that genus more closely than any known American species.

HEPIALUS Linn.

Hepialus mustelinus n. sp.

♀. Sable brown. Head and thorax sable brown. Scales at the base of the abdomen and secondaries yellowish brown. Three broad silvery spots on the costa margined with black; a broad silvery line along the internal margin, which is continued as a submarginal oblique straight line, dislocated on the 2nd median, and margined with yellowish brown, with some black scales. A marginal series of triangular spots. Fringe dark at the base, spotted externally with silver.

Beneath, thorax and abdomen yellowish brown, as is the costa, which is banded by three dusky patches. Dusky in the median portion of the wings. Legs dark externally.

Length of body, .60; exp. wings, 1.30 inch.

Not uncommon at Brunswick, Me., at light in August.

Mass., (Coll. Sanborn.)

Hepialus labradoriensis n. sp.

Uniform dark sable brown. Primaries narrower and more produced towards the rounded apex than *H. mustelinus*, which it closely resembles. The outer edge of the wing is also much more oblique. Some darker scales along the median nervule. In the middle of the submedian space is a large black angulated spot, margined with light brown. A submarginal straight oblique broad paler band, dislocated in the middle of the wing, curved between the nervules, and enclosing black dots; margined externally with blackish scales.

Secondaries uniform sable, of a paler hue than in the preceding species. Fringe concolorous. Beneath colored the same as above.

Length of body, .60; exp. wings, 1.45 inch.

Salmon Bay, on Caribou Island, Labrador, Straits of Belle Isle, August 3rd, 1860. (A. S. P., Jr.)

Hepialus carnus Fabr.? Walk. Cat. Lep. Br. Mus. VII. p. 1556. (1856).

St. Martin's Falls, Albany River, Barnston, (Walk.)

ERRATA TO SYNOPSIS PART I.

Page

97, line 26, for Shurtliff read Shurtleff.
98, line 27, for 1860 read 1862.*
100, line 3, for Hand. read Hund.
100, line 23, for badly read hardly.
101, line 22, for as read of.
102, note, for Ἐν read Ἑν.
103, line 12, for Hand. read Hund.
103, line 24, for Hand. read Hund.
104, line 16, for Agrassiz read Agassiz.
105, line 13, for papillated read pupilled.
107, line 3, for synonyme read synonymy.
107, line 28, for Boids read Boisd.
107, line 32, for II read III.
107, line 32, in parenthesis insert 1855.
109, line 15, for they read there.
109, line 16, for *Oneogyna* read *Ocnogyna.*
110, line 32, dele ; after secondaries.
111, line 18, for wings read winged.
111, line 21, for Monatsl. read Monatsb.
114, line 21, dele , after "third."
116, line 13, for Hand. read Hund.
116, line 36, for Zeveite Hand. read Zweite Hund.
117, line 2, for synoysis read synopsis.
125, line 3, for *pseudermia* read *pseuderminea.*
125, line 30, for 3rd read 3d.
126, line 10, insert after 2.05 the word inches.
126, line 17, for *Eupractis* read *Euproctis.*
126, lines 19, 24 and 36, dele Clem., to, and insert Append. *after* Amer.
126, line 29, for *Cycma cunca* read *Cycnia cunea.*
127, line 24, for inches read inch.
127, line 29, insert *Phalæna* before *oculatissima.*
128, line 6, dele Hübn. before Geyer's.

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* The date of Morris' Synopsis should read 1862 instead of 1860.

EXPLANATORY NOTE.

Since the issue of the first part of this Synopsis, I have learned from Mr. A. Agassiz that the species of Arctiadæ, mentioned as collected by him in California, were presented by him to the Mus. Comp. Zoöl. under the condition that they should not be described, and moreover, that some of the species were presented by Dr. Behr of San Francisco, to the Cambridge Museum, with the understanding that no one but himself was to work them up.

Having published my notes upon these species, I should state in explanation, that when I became a student in the zoological department of the Lawrence Scientific School, Professor Agassiz placed the entire collection of Bombycidæ in my hands to study, and neither at that time nor at any period until now, have I had any intimation from the Director of the Museum, or learned indirectly from any label on the boxes or insects themselves, that the insects were not exclusively and without any conditions the property of the Museum. Also, I was entirely ignorant that any one but Mr. Agassiz had collected any of the specimens, since, according to the best of my recollection, his name alone appeared upon the labels as the collector.

Through ignorance I have thus done an unintentional injustice both to Mr. Agassiz and Dr. Behr, and take this opportunity of expressing my sincere regret at having unawares used material which it seems both of these gentlemen had reserved for their own use.

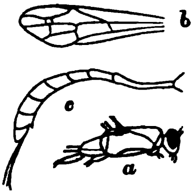
Descriptions of two new genera of North American ICHNEUMONIDÆ.

BY E. T. CRESSON.

GROTEA nov. gen.

Head subglobose; face prominent; eyes moderate, ovate, obtusely emarginate opposite the insertion of the antennæ; ocelli placed in a triangle on the vertex; clypeus slightly transverse, broadly rounded at base, deeply impressed on the disk, rounded and recurved at tip; mandibles moderate, deeply bifid at tip; palpi filiform, rather slender; the throat, immediately behind the oral cavity, is narrowed on each side into an acute tooth. *Antennæ* long and slender, slightly thickened at the tip, with about 46 joints; the basal joint robust, short and globose, obliquely truncate exteriorly and receiving the 2nd and 3rd joints, which are minute; 4th joint long; 5th about half the length of the 4th; remaining joints gradually shorter, the terminal one pointed. *Thorax* long and narrow, much prolonged before the wings (Fig. 1, *a*), rounded in front; pectus gradually pointed behind and extending to the tip of the tegulæ; mesothorax oblong-ovate, depressed; pleura rather large, excavated beneath the wings; scutellum small, subquadrate, convex; metathorax rather small, convex. *Wings* (Fig. 1, *b*) moderately long, narrow; stigma long and narrow, removed further towards the tip of the wing than usual; marginal cell elongate, sublanceolate, extending all the way to the apex of the wing, the lower nervure faintly curved towards the tip; submarginal cell elongate, receiving the first recurrent nervure about the middle; areolet* removed nearer to the tip of the wing than usual, broad, 5-angular, the side nervures oblique, the second recurrent nervure almost straight, faintly sinuate in the middle, and received by the areolet a little beyond

Fig. 1.



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[*] The areolet is too square in the figure; the lateral nervures should be more oblique, so as to make the posterior part broader, and the lower nervure should be slightly angular at the junction with the 2nd recurrent nervure which is nearer the tip of the areolet than is represented in the figure.

the middle. *Legs* simple, rather short and tolerably robust, the posterior pair the longest and stoutest; posterior coxæ elongate, almost as long as the femora, which are short and somewhat thickened; tibial spurs moderate; tarsi slender, claws very robust, curved and acute at tip, pulvuli large. *Abdomen* (♀, Fig. 1, *c*) petiolated, very long, slender, strongly arcuated beyond the basal segment which is one-third the length of the abdomen, slender, linear, recurved towards the tip, with a subobsolete tubercle on each side of the middle, tip slightly dilated; 2nd and following segments gradually shorter and broader, the apex faintly subcompressed, truncate in the ♂; beneath, the tip is slit longitudinally in the ♀, the ovipositor about as long as the 1st segment of the abdomen.

This singular genus may be easily recognized by the elongate, flattened thorax being unusually produced before the wings; the long and narrow wings, the situation of the stigma and areolet unusually near the tip of the wings, and the long, slender, arcuated abdomen, and its long, cylindrical, recurved basal segment.

It gives me pleasure to dedicate this interesting genus to my friend and fellow student, Mr. Augustus R. Grote, the distinguished American lepidopterist, by whose zealous endeavors the Collection of the Entomological Society is being constantly increased.

Grotea anguina, n. sp.

Female.—Head yellow, shining, the vertex and occiput, except the orbits, more or less ferruginous; antennæ three-fourths the length of the body, fulvous, the three or four basal joints tinged with dusky above, at the apical third a small black annulus, covering three or four joints, beyond which the joints are bright yellow. Thorax smooth and polished; collar yellow, ferruginous at base, pectus and pleura yellow, and highly polished, the sutures blackish; on each side of the pleura a broad, longitudinal, ferruginous dash, the anterior half of which is margined above with black; mesothorax ferruginous, with two more or less distinct, longitudinal, central, yellowish lines, the lateral sutures blackish; scutellum yellow, as well as the postscutellum; metathorax highly polished, smooth, ferruginous, a spot on each side at base and the extreme apex yellow, just before the middle a tolerably well-defined, transverse, slightly sinuate carina, meeting on each side a longitudinal carina;

tegulæ yellow. Wings hyaline, glossy, faintly iridescent; nervures and stigma black. Legs yellow, polished; the posterior pair, except their coxæ at base beneath, and tips of their femora, fulvo-ferruginous, their tibiæ and tarsi paler, the latter dusky at tips; the anterior femora are slightly tinged with ferruginous. Abdomen with the basal segment ferruginous and polished, blackish above at base, and tinged with yellow on each side and at extreme tip; remaining segments subopaque, fuscous above, darker towards the tip, with a bluish iridescence, the apical margins of the segments pale, and the sides more or less yellow; beneath yellow, tinged with ferruginous; ovipositor longer than the first segment of the abdomen, dull rufous, the valves bright yellow, black at base and tip, more broadly so at base. Length 8 lines; expanse of wings 10 lines.

Male.—Like the female, except that the antennæ are without the black annulus on the apical third, and the abdomen is not so much tinged with yellowish laterally.

Hab.—New Jersey, (Coll. Ent. Soc. Phil.) New York, (Coll. Mr. James Angus.) Four specimens.

Mr. Angus has reared both ♂ and ♀ of this singular insect from a Raspberry stem, together with a small species of *Crabro*.

LABENA, nov. gen.

Head transverse; face rather prominent, quadrate; eyes large, slightly emarginate opposite the insertion of the antennæ; ocelli placed in a triangle on the vertex; clypeus subtransverse, depressed, truncate and subcarinate at base, rounded at tip; mandibles moderate and stout, acutely bifid at tip; palpi filiform, moderate. *Antennæ* rather long and tolerably stout, with over 50 joints, the basal joint short and robust, obliquely truncate on the outside, receiving the 2nd and 3rd joints, the last of which is minute; 4th joint nearly as long as the three basal joints together; remaining joints gradually shorter, the incisures distinct and prominent in ♂, indistinct in ♀. *Thorax* short and robust; mesothorax ovate, slightly convex; scutellum rather prominent, suborbicular; metathorax moderate, convex, with distinct elevated lines. *Wings* long and ample, the neuration resembling that of *Grotea*, except that the discoidal cell is much shorter, the outer nervure or second recurrent nervure is angular in the middle, and the areolet is rhomboidal. *Legs* simple, the two anterior pairs rather short, the posterior pair elongate, robust, their coxæ unusually long, more robust in ♀, about equal in length with the femora, which are robust, the trochanters elongate; tibiæ and tarsi slender; tarsal claws long and simple, curved and acute at tip, pulvuli small. *Abdomen* elongate, subpetiolated or slightly subsessile, gradually thickened towards the tip; basal segment longest, slightly dilated at tip with a tubercle, more or less distinct, on each side before the middle; 2nd segment about one-fourth shorter than the 1st, the remaining segments each shorter than the 2nd, subequal; beneath, the tip is slit longitudinally in ♀, the ovipositor as long as the abdomen.

This genus may be readily distinguished by the very elongate, subcylindrical posterior coxæ; the elongate, clavate abdomen, and the neuration of the wings, which is very similar to that of *Grotea*. The ♀ is larger and much more robust than the ♂, with the abdomen more strongly clavate.

Labena grallator, Say.

Cryptus grallator Say, Bost. Journ. Nat. Hist. i. p. 236.

Female.—Ferruginous, or fusco-ferruginous; face rugose, occiput and cheeks, smooth and polished; orbits, and the margin in front and behind the ocelli, yellowish; the clypeus, mandibles, except tips, and the palpi, tinged with yellowish, a band across the vertex, covering the ocelli, and tips of the mandibles, black; antennæ about two-thirds the length of the body, stout, fusco-ferruginous, sometimes blackish, orange-yellow from the 13th or 14th joint to the apical fourth, the basal joint beneath tinged with yellowish. Thorax shining, densely and closely punctured; sides of the collar, upper margin of the pectus, a line beneath the fore-wings, a spot beneath the hind-wings, and two subobsolete longitudinal lines on the mesothorax, yellowish; the sutures of the thorax black, that between the pleura and metathorax margined with yellow; scutellum minutely and closely punctured, yellow, (sometimes obscure) as well as the postscutellum and the space on each side; the excavation in front of the scutellum blackish; metathorax pubescent, finely and closely punctured, ferruginous, more or less stained with yellow behind, the elevated lines sharply defined, forming a large, subquadrate, 6-sided, central area; on each side, just above the insertion of the posterior coxæ, a rather large, black tubercle; tegulæ longitudinal, yellowish-ferruginous. Wings ample, dark fuscous, with a brilliant brassy gloss, and a more or less deep violet reflection; beneath the stigma an oblique, subhyaline dash, sometimes extending, irregularly, to the posterior angle of the wing, the base is sometimes subhyaline, and the large posterior basal cell of the hind-wing is entirely hyaline; nervures blackish, stigma ferruginous; areolet large, rhomboidal, prolonged towards the base of the wing. Legs ferruginous, the posterior coxæ, trochanters and femora, darker; the four anterior coxæ varied yellowish; tips of all the femora, and the tibiæ and tarsi, orange-yellow, the extreme tips of the latter dusky. Abdomen elongate, convex, clavate, shining, with a more or less distinct purple iridescence, and clothed, especially towards the tip, with a very short and fine yellowish-sericeous pubescence; apical margins of all the segments narrowly yellowish, sometimes obsolete, the incisures between the segments rather deep and blackish, less distinct towards the tip, which is broad and robust; beneath, the segments are yellowish, with large, lateral, blackish stains; ovipositor as long as the abdomen, stout, black, valves orange-yellow, their apical third black. Length 8½—10½ lines; expanse of wings 13—18½ lines.

Male.—Resembles the female, but is smaller, the face entirely, the pectus, the upper part of the pleura, two distinct central lines on the mesothorax, as well as its lateral margins, and the four anterior legs, including their coxæ, are bright yellow; the apex of the first and second abdominal segments are more broadly yellow, and the lateral blackish stains on the venter are smaller; the abdomen is more slender and subclavate; the antennæ are as long as the body, without any annulus, as in the female, and more or less blackish above towards the apex, and the wings are more varied with hyaline and subhyaline. Length 7½—8 lines; expanse of wings 13—14 lines.

Hab.—New York, (James Angus); Pennsylvania, (Geo. Newman); Delaware, (Dr. T. B. Wilson). Five specimens. (Coll. Ent. Soc. Phil).

A large and fine species, easily recognized by its dark fuscous wings, more or less varied with subhyaline.

Labena apicalis, n. sp.

Male.—Pale ferruginous, or honey-yellow, slightly pubescent; face finely rugose, yellow, as well as the space before the ocelli, the orbits and the clypeus; a band across the vertex, covering the ocelli, and tips of the mandibles, black; antennæ as long as the body, porrect, honey-yellow, black at tips, paler beneath. Thorax shining, very finely and closely punctured; a line on each side of the collar, margins of the pectus, a spot on upper part of the pleura, and a line beneath the fore-wings, yellowish; mesothorax entirely dull ferruginous; scutellums yellowish-ferruginous; metathorax pubescent, dull ferruginous, shining, the apex tinged with yellowish, the elevated lines sharply defined, forming a large, subquadrate, 6-sided, central area; tegulæ longitudinal, yellowish-ferruginous. Wings long, ample, hyaline, glossy, rather iridescent, the apex of both anterior and posterior pair dark fuscous; nervures fuscous, stigma ferruginous; areolet large, rhomboidal. Legs honey-yellow, polished; the two anterior pairs, and the posterior tibiæ and tarsi, tinged with yellowish; tips of all the tarsi blackish. Abdomen elongate, slender, gradually thickened towards the apex, which is slightly incurved; the segments polished and convex, with the apical margin of the first four, more or less yellowish; beneath yellowish, with large lateral blackish stains. Length 6½ lines; expanse of wings 9½ lines.

Hab.—Delaware. Dr. Thomas B. Wilson. One specimen. (Coll. Entom. Soc. Philad.)

Closely allied to *L. grallator*, but is smaller, and at once distinguished by the hyaline wings, with only their apex fuscous.

ON PHYTOPHAGIC VARIETIES AND PHYTOPHAGIC SPECIES.

BY BENJ. D. WALSH, M. A.

It is well known, especially to breeders of Lepidoptera, that there are certain species of Insects, which in the larva state feed only on one particular species or a few closely allied species of plants, and others which feed on a great variety of plants belonging to different species and genera, and even to different and widely distinct families. For example, *Attacus Luna* Drury occurs only on the walnut and hickory, while *Attacus Cecropia* Lin. is found, according to Harris, on apple, cherry and plum trees, and on currant and barberry bushes, and I have reason to believe that it feeds also on the common hazel. But there is a still more remarkable example of diversified tastes in *Dryocampa imperialis* Drury, which feeds sometimes on the sycamore, an angiospermous tree, and sometimes on the pine, a gymnospermous tree.

Occasionally this difference of food causes certain differences in the insect itself, either in the larva or in the imago state. Thus the larvæ of *Datana ministra* Drury that occur on the oak, the apple tree, the thorn and several other trees, almost invariably have a large yellow spot behind the head, and always have pale longitudinal lines on the body; while those that are found on the hickory are either entirely black, or are longitudinally lineate with whitish without any yellow spot behind the head. But as this last variety also occurs on the oak, and the imago bred from the black variety on the hickory is absolutely identical with the imago bred from the yellow-necked and striped variety on the oak, as I have experimentally ascertained, it would seem that the two forms cannot be distinct. Again, I have taken numerous specimens of *Chrysomela scalaris* Lec. on the elm and basswood, which measure in length .35—.40 inch; and on the dogwood (cornus) and wild plum I have for many years back taken whole swarms along with their larvæ, which ranged from .27 to .30 inch in length, and none of which exceeded the latter measurement. Yet on the closest inspection I could discover no other distinctive character but size, and on forwarding specimens of both forms three years ago to Dr. LeConte with a statement of the facts, they were pronounced by him to be identical. It is observable that Rogers gives the length of this species as .32—.40 inch, (*Proc. Ac. Nat. Sc. Phil.*, Feb. 1856, p. 32) and Harris as "about .30 inch," the accompanying figure being .40 inch long. (*Inj. Ins.* p. 132.)* Thirdly, *Haltica alternata* Illig. (= 5-*vittata* Say according to LeConte MS.) is stated by Say to be "found in considerable numbers on the common elder (Sambucus) and some other plants," and is described by him as having five vittæ on the elytra. Although he notices two variations in the coloration of the head and thorax, he says not a word as to the elytral vittæ ever being subobsolete or obsolete. (*Say's Works*, II. p. 227.) I have three specimens in my Cabinet, captured some years ago, but on what plant I have no record, all of which have the elytral vittæ deep black, and very nearly as wide as the yellowish interspaces. As the elder grows abundantly near Rock Island, they may very probably have fed in the larva state upon that plant. In the first few days of August, 1864, I captured on the gall *Salicis brassicoides* Walsh, which is peculiar to Salix longifolia, a subaquatic willow, six specimens with the elytral vittæ distinct and black but ⅓ narrower than in my Cabinet specimens, and one with the elytral vittæ pale and almost obsolete; and on August 6th, I bred a specimen from that gall with the elytral vittæ pale and almost obsolete. On August 9th I captured, mostly on the wing, in a patch of Salix humilis —a dwarf upland willow, which bears a gall, *Salicis rhodoides* Walsh, constructed on the same principle as *S. brassicoides*—twenty specimens of this species, one with the vittæ distinct and black but ½ narrower than in my cabinet specimens, seven with the vittæ pale and more or less indistinct, and twelve with the vittæ more or less entirely obsolete. I have also received from Chicago two specimens with the vittæ entirely obsolete, but on what plant they occurred I do not know. From these facts I infer that *H. alternata*, when it inhabits the elder, has the elytral vittæ distinct and black, and that, when it inhabits the willow, there is a strong tendency for those vittæ to become obsolete, less strong perhaps when it feeds on Salix longifolia, and more strong when it feeds on S. humilis. Finally, I know from my own boyish experience, that when the common silk worm is fed entirely upon lettuce leaves from the egg to its adult stage, it always spins not yellow, but whitish silk; but whether this variation in the color of its secretions is correlated with any variation in the larva or imago state of the insect, I cannot say. Many other such examples will occur to every intelligent and observing field-entomologist. Varieties of the above character, i. e. where certain unimportant characters in the insect are correlated with the food-plant, while at the same time there is no sufficient reason to doubt that the two varieties freely intercross, I propose, for convenience' sake, to call Phytophagic Varieties. We may observe that Phytophagic Varieties, like Dimorphous and Trimorphous forms, (*Proc. Ent. Soc. Phil.* pp. 221—3) sometimes—at all events if the dwarfed form of *Chr. scalaris* be considered merely as a variety—offer an exception to the general law, that the absence of intermediate forms proves diversity of species.

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* I have noticed that *C. Bigsbyana* Kby. occurs *along with its larva* exclusively on willows, and *C. casta* Rogers, on a weed, the name of which I do not know. *Casta* is an Illinois and Kansas species, and is supposed by Dr. LeConte (MS.) to be a mere variety of *pulcra* Fabr.; but *pulcra*, which is a much larger species, does not occur near Rock Island, while *casta* is very abundant there. It would be interesting to know on what plant *pulcra* feeds, and also on what plant *Chr. Philadelphica* feeds, which so closely resembles *Bigsbyana*. Of *Philadelphica* I have taken but a single specimen near Rock Island in seven years, while *Bigsbyana* is very abundant there. It will be a great help towards separating the species of this difficult genus to note the plant or plants on which they are found *in company with their larvæ*, i. e. on which they feed.

Even with the little we know of the Laws of Inheritance, we might infer *a priori*, that when from peculiar circumstances a Phytophagic Variety, including both the sexes, has fed for a great many generations upon one particular plant of the number inhabited by the species to which it belongs, it would be likely to transmit to its descendants in the imago state a tendency to select that particular plant upon which to deposit its eggs. We know, for example, that young pointer puppies, when taken into the field, will frequently point game without any instruction or training whatever, though the habit of pointing is clearly an acquired and not a natural habit, and must have been transmitted to them from their ancestors in virtue of the Laws of Inheritance. If, then, it should so happen, that, owing to the presence of but a single species of the plants ordinarily fed upon by a particular species of insects, or to other causes, eggs have been uniformly deposited by a Phytophagic Variety upon the same plant for an indefinitely long series of generations—say fifty, or a hundred, or a thousand, or ten thousand—

and the female has in no case intercrossed with a male belonging to a different Phytophagic Variety, then it is probable that habit will have become a second nature, and that it will cease to be possible for that insect, which by the supposition has fed upon that one plant for a very long series of years, to feed upon any other plant than that to which it has become habituated by the Laws of Inheritance.

But before this point is reached, another series of phenomena will have come into play. Every naturalist is aware that species often run into what are known as geographical races, when separated into two or more distinct groups by physical barriers. Just so the Phytophagic Variety, having by the supposition been isolated from the other members of its species, will often run into what may be called Phytophagic Races, and finally perhaps acquire either a moral indisposition, or a physical inability, to intercross with the other members of the species. It will then have become what I propose to call a Phytophagic Species, distinguished from the other members of the species to which it originally belonged by certain slight peculiarities of size, or of coloration, or occasionally even of structure, just as geographical races are so distinguished. But there will be this essential difference between the two cases: Geographical Races are connected, or supposed to be connected, by all the intermediate grades, and may therefore be reasonably concluded to intercross on the confines of their geographical boundaries. Phytophagic Species are not so connected, and by the supposition they do not intercross, or, at all events, only in very rare instances, as is sometimes the case with what are allowed on all hands to be distinct species.*

According to my views, Phytophagic Species are as truly distinct species as those which differ by much stronger characters. "The only valid practical criterion," as I have already said, (*Proc. Ent. Soc. Phil.* II. p. 220,) "of specific distinctness is the general non-existence, either actually ascertained or analogically inferred, of intermediate grades in the distinctive characters, whence we may reasonably conclude that the two supposed species are distinct, i. e. that they do not now in general mix sexually together, or if geographically separated, that they would not do so, supposing them to be placed in juxtaposition." According to this view of what Darwin calls "the undiscovered and undiscoverable essence of the term species," (*Orig. Spec.* p. 421,) it is immaterial whether the distinctive characters be slight or strong, so that they be perfectly constant. But as many naturalists are of opinion, that to constitute a distinct species it is necessary that the distinctive characters should be tolerably strong, it will be better to distinguish Phytophagic Species by this particular denomination, and not confound them with the general mass of what are known as distinct species. After all, the difference of views on this subject is a difference only in words and not in things. I consider as species all forms which do not habitually intermix in a state of nature—as according to the definition of the term Phytophagic Species do not—the absence of intermediate grades being, as a general rule, taken as the criterion of the species not habitually intermixing in a state of nature. Others require in addition, that the distinctive characters should be of a certain type, which is left to be fixed and defined in each particular genus by certain varying and somewhat indefinite rules. It is evident, therefore, that the term "species" is used here in two different senses, and to avoid ambiguity it is necessary to distinguish the doubtful and disputed forms by some particular name.

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* Mr. Henry Shimer, of Carroll County, Illinois, writes me word that he has recently seen ♂ *Hippodamia maculata* DeGeer copulating with ♀ *Coccinella novemnotata* Hbst. He has sent me specimens of both species, and I have no doubt that they were rightly determined by him. Similar examples in this family have already been referred to by me. (*Proc. Ent. Soc. Phil.* I. p. 351.)

It may be asked why the process by which Phytophagic Species are formed is not reiterated on all hands, till Nature becomes a Babel of confusion and the number of distinct species equals the grains of sand on the sea-shore. The answer is simple. There are two great antagonistic forces in Nature, the Law of Variation, causing individuals of almost all species to assume occasionally abnormal characters or abnormal propensities, and what may be called THE LAW OF ASSIMILATION, which, by the intercrossing of these abnormal individuals and their descendants with the normal type, gradually in successive generations softens down, eliminates and extirpates whatever is strange and peculiar in them. Thus, American families of the pure Caucasian race, which intercrossed in a single instance many generations since with the Red Indian, have already, by successive intercrosses with the White Race, completely eliminated all traces of Indian blood. It can only be in very rare cases indeed, that the process which I have been describing can be carried to its full completion, because it can only be in very rare cases indeed, that intercrossing with the other Phytophagic Varieties of the same species can be avoided, and the Law of Assimilation prevented from coming into play.

If these views be correct, we might expect to find Phytophagic Varieties and Phytophagic Species most abundant in those vegetable-feeding genera, where the imago flies but little, or flies very weakly, or has no wings at all, and where consequently intercrossing does not so readily take place. Such genera are *Cynips* and its allies in Hymenoptera, *Cecidomyia* in Diptera, *Aphis* and its allies and *Coccus* and its allies in Homoptera, *Tingis* in Heteroptera, and *Diapheromera* in Orthoptera, though this last makes up perhaps to a certain extent for its want of wings by its great powers of walking. All authors have remarked upon the minute shades of difference that distinguish the species of the four first genera and their allies, and upon their being frequently restricted to certain species of plants. I have myself recently observed, that an apparently undescribed species of *Tingis*, which occurs profusely on the basswood and the false indigo (amorpha fruticosa), when it occurs on the latter plant is always distinguished from the bass-inhabiting type by the carinate basal cell of the elytra terminating behind nearly in a rectangle, instead of an angle of about 60° or 80°, and is probably, therefore, divisable into two Phytophagic species.*

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* I have before referred to this *Tingis*, (*Proc. Ent. Soc. Phil.* I. p. 295,) though I had not then noticed the nice structural distinction between the two forms inhabiting respectively the bass and false indigo. Some specimens found on the wild cherry were identical with the bass-inhabiting form, and as they occurred on a tree not far removed from several basswoods, might possibly have flown there from them. The false indigos on which the other form occurred had no trees growing within a furlong of them. Believing the two forms to be distinct Phytophagic Species, and that both are undescribed, I annex descriptions:

Tingis tiliæ n. sp. Pale brownish yellow. *Head* more or less blackish. Eyes black. Antennæ nearly as long as the body, finely pilose when held up to the light, the terminal joint thickened and blackish, joints 1 and 4 each twice as long as joint 2, and joint 3 about four times as long as joint 4. *Prothorax* laterally dilated in a thin, semitransparent plate directed upwards and outwards, and filled with small suborbicular cells like those of the elytra. This plate commences from nothing at the origin of the elytra, and thence gradually widens to one-fifth the width of the entire prothorax at the lateral middle, where it curves inwards rather suddenly and is prolonged forwards in a very gentle con-

And lastly, I have in 1864 found a ♀ *Diapheromera* in a place overgrown by weeds beneath the boughs of two isolated ash-trees, which differs remarkably from some dozen ♀ *D. femorata* Say which I have examined, in the caudal appendages (cerci) being nearly four times as long, and the supraanal plate larger and more elongated, and also in the anterior femora being rather incrassated than laterally dilated into a thin plate, in their dilatation being considerably less and

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vex curve without varying in width, and extends over the head in the form of an elevated oblong, which projects forwards nearly in a rectangle with its apex obtuse, and is carinate longitudinally above. From the hind margin of this oblong extend backwards the three normal carinæ, the outer ones gently sinuate, but the general course of the three nearly parallel. The spaces between these carinæ, and outside them as far as the thin plate of the prothorax, are blackish and rugose as far back as the insertion of the elytra; the triangular space behind that insertion being covered with large, dilated confluent punctures, having much the appearance of the small suborbicular cells of the elytra. Beneath, except the lateral plates of the prothorax and the carinate edges of the central pieces of the sternum, blackish. *Elytra* hyaline on their terminal half, but with the cell-veins there pale yellowish brown and occasionally towards the tip of the wing a few of them irregularly blackish; the large carinate cell at their base extending nearly half way to the tip, and terminating in an angle of 60°—80°, from which there extends a simple sinuate carina nearly to the tip. A little on the basal side of the middle of the elytrum and extending half way to its base, the veins outside the large carinate cell are irregularly and variably blackened more or less, so as often to present the appearance of 1—3 transverse blackish lines; and occasionally the blackness extends across the entire elytrum, so as to appear like a blackish fascia. *Legs* with the tarsi, or sometime only their tips, blackish.—Length about .15 inch. Eleven specimens from basswood, three from wild cherry. Very abundant near Rock Island on the basswood.

Tingis amorphæ, n. sp. Differs from the above only in the large, basal, carinate cell of the elytra terminating behind nearly in a rectangle instead of an angle of 60°—80°, and in the veins of the wings, both those on the basal side of the middle and those at the tip, being on the average of specimens much more deeply stained with black, though individuals of the two species occur which are identical in this character.—Length about .15 inch. Eighteen specimens on Amorpha fruticosa.

I possess in this genus *T. mutica* Say, *plexus* Say, *oblonga* Say, *juglandis?* Fitch, and eight or nine other species, most of which are probably undescribed. Say gives the length of *T. arcuata* as nearly three-*tenths* of an inch, but this is probably a typographical error for three-*twentieths*. (Compare Fitch *N. Y. Rep.* II. § 193.) Conversely in Say's Works (II. p. 131) the length of *Copris anaglypticus* is given as 7-20 instead of 7-10 inch.

not commencing quite so abruptly near their basal portion, and in the general color being grass-green instead of cinereous-brown. After I had recognized the above as a distinct species, I received from my ornithological friend, Dr. Velie of Rock Island, single specimens of both sexes, captured by himself in a place overgrown by weeds, but with no trees within a long distance of it, on the North bank of the Platte River, in Nebraska The ♀ agrees in every respect with mine; the ♂ differs from the ♂ of *femorata*, 1st, in the general color being much more green, 2nd in the anterior femora being rather less incrassated, 3rd in the middle femora not being trifasciate with brown, 4th in the supra-anal plate terminating in two acutely angular, horizontally flattened teeth, instead of being rounded at tip, 5th in the interior base of the caudal appendage being furnished with an acute thorn, directed backwards and nearly as long as the appendage is wide, instead of a large, vertically flattened, rounded lamina directed backwards. In all other respects both sexes agree with *femorata*, but the marked difference in the caudal appendages ♂ ♀ would alone be sufficient to separate them as distinct. I propose for this species the name of *Diapheromera Velii.* Although there is no positive proof that it is a Phytophagic Species, yet as *femorata* ordinarily occurs upon forest trees, (oak, basswood, &c.,) and never, so far as I have observed—and I have probably had a thousand specimens pass through my hands—in localities where there are no trees, I incline to believe that it is.

It is not necessary, however, that in every case Phytophagic Species should take their origin from Phytophagic Varieties, using the term "variety" in the sense ordinarily given to it by entomological Systematists. It sometimes happens that what is to all external appearance one homogeneous species is composed of two or more distinct races, feeding each upon a distinct plant, but not distinguishable, either in the imago or so far as known in the larva state, by any external characters whatever, whether colorational or structural. We meet apparently with a case of this kind in *Cynips q. spongifica* O. S. and *C. q. inanis* O. S., the former of which forms a gall on the Black Oak and the latter a very different gall on the Red Oak, the imagos ♂ ♀, with the exception of the dimorphous ♀ form of the latter which is unknown, being to all appearance identical. I inclined to the opinion at one time that these two forms were identical, the difference in the species of oak causing the difference in the nature of the galls, and the poisonous matter producing the gall being the same in both forms. But there are so many *Cynips* that produce exactly the same kind of gall on different species of oak, that it would seem that these two forms must be true Phytophagic Species, each generating a peculiar kind of gall-producing poison, and each with such internal differences as to cause them to generate secretions with such very different properties.

That there may be no possible mistake, it may be as well to say here, that the difference between what I call a Phytophagic Variety and what I call a Phytophagic Species is simply this:—The former habitually intercross with the normal race, the latter do not. Of course there must often be cases, where the fact of their habitually intercrossing or not so intercrossing is doubtful or cannot be satisfactorily inferred or ascertained, and allowing that the former category sometimes gradually in a long period of time merges into the latter, there must be occasionally intermediate categories. Still this is no reason why we should doubt or deny the existence of the categories themselves. Boyhood is one thing, and manhood is another thing; but there are intermediate periods when it is difficult to say whether the individual in question is boy or man. Yet it would be strange logic to argue that, on that account, boyhood was the same thing as manhood.

It must be obvious to every one, that it is impossible to trace the gradual formation of what I have called a Phytophagic Species *in time*, because by the supposition it requires very long periods of time for its development, and Natural History as a science is only a hundred years old. But if we are able to discover the several steps in the above-described process, not indeed in one and the same species, but in different species, and can thus trace an uninterrupted series from the first origin of the Phytophagic Variety to the full development of the Phytophagic Species, to all minds unbiassed by preconceived theories the proof will be complete. In any case, assuming the truth of the above Theory, this is the only possible way, in which for ages to come that truth can be demonstrated. For any one therefore to refuse to admit the validity of such proof, is equivalent to saying, that, even if the Theory is true, he will not believe it on the best possible evidence.

Investigations of this character require laborious and tedious experiments in the closet, and habits of patient observation and industry in the field. The systematist who in his closet receives specimens from the four quarters of the globe, and busies himself in arranging and classifying them, can discover nothing here, or if he does he must be dependent entirely upon the accuracy of out-door observers. My present object, however, is not so much to adduce new proofs upon this subject, as, in the light of my subsequent experience, to correct, modify and enlarge upon those proofs which I have already adduced in a Paper published in the Proceedings of the Boston Society of Natural History, Feb. 1864. In the following paragraphs I shall refer to that paper by the page.

HALESIDOTA (lophocampa) ANTIPHOLA Walsh, (pp. 288—290.) I have shown here that the imago of *H. tessellaris* Sm. Abb., the larva of which feeds only on the sycamore, is absolutely undistinguishable from that of *H. Antiphola*, the larva of which feeds on the oak, the basswood and several other trees. But from trusting to a description drawn up some years ago, which I found in my Journal, one of the characters which distinguish the two larvæ is incorrectly stated. The black pencils on the thorax of the larva of *Antiphola* are in reality placed upon the same segments as the orange-colored pencils of *tessellaris*, viz. on the 2nd and 3rd, and not on the 1st and 2nd segments, as I have erroneously asserted; but they are invariably black, and those of *tessellaris* invariably orange-colored. The general color of the hair of *Antiphola* varies, as I have stated, "from dirty whitish to fuscous cinereous, and from ochre-yellowish to pale yellowish brown," all these varieties occurring on the same tree, the oak, and the same individual often changing its color in confinement. But I have this year met with a single specimen that was almost pure white, and two others that were straw-colored or pale gamboge-yellow; and the one that was nearly white changed its color in confinement in a single day to pale gamboge-yellowish. On the other hand the general color of the hair of all *tessellaris* that I have seen, some hundreds in number, was milk-white, though Dr. Harris describes them as "light-yellow or straw-colored." (*Inj. Ins.* p. 363.) Mr. Edwards also, to whose experience I had appealed on this point, says that "he knows the larva of *H. tessellaris* very well, and that to the best of his recollection they are white, though he would not like to assert positively that they had not a yellowish tinge." And Mr. J. A. Lintner writes me word that "he has frequently noticed *white* tussock-larvæ on the trunks of the buttonwood [sycamore], which he presumes must be those of *H. tessellaris*, though he has not identified them with that species." In mature or nearly mature *Antiphola* the head is black; in half-grown or quarter-grown individuals, especially the latter, generally but not always pale rufous. In *tessellaris* of all ages the head is as described by Harris "brownish yellow" or pale rufous. (*Ibid.*)

I strongly incline to believe that *Antiphola* is the species known to Dr. Harris only in the larva state, and stated by him to occur "on the black walnut, the butternut, the ash and even on the oak," (*ibid.* p. 362,) although that species is not described by him as having any pencils on the 3rd segment, as *Antiphola* has. In all other respects the description agrees exactly. The pencils in the larvæ of this genus are so fragile, that the least touch knocks them off, and the specimen or specimens examined by Dr. Harris might have been so mutilated. There seems some peculiar proclivity to error in the matter of these pencils; for besides my own blunder referred to above, in the recent illustrated edition of Dr. Harris's *Injurious Insects* the larva of *H. caryæ* is figured with black pencils both on the 10th and 11th segments, whereas according to Dr. Harris's own description it has none on the 11th segment. (Compare *Inj. Ins.* Plate vi. fig. 1 and p. 361.) Whether the draughtsman or the engraver is here in error, or whether Dr. Harris himself is in error, I cannot say, as the species, though it occurs near Rock Island very rarely in the imago, is totally unknown to me in the larva state; but there is evidently error somewhere. I subjoin an amended and enlarged description of the larva of *Antiphola*.

H. Antiphola Walsh, (larva.) *Head* black, polished, the mouth varied with white. *Body* opaque black above, pale on the venter, covered above with dense hairs proceeding from little warts in evenly-shorn brushes or tufts, which are dorsally a little darker, and vary in color in different specimens from dirty whitish or occasionally almost pure white to fuscous cinereous, and from pale gamboge-yellowish to ochre-yellowish and pale yellowish brown, the brushes on the back converging so as to form a dense dorsal ridge. On the 2nd segment behind the head one lateral black pencil and two milk-white ones under it, all transversely arranged, the black pencils generally in repose directed horizontally forwards. On the 3rd segment one lateral black pencil and one milk-white one under it, directed obliquely forwards. On the 11th segment one lateral black pencil directed obliquely backwards, and on the 12th segment one less obvious pencil, which is either whitish or the color of the tufts of the body, placed immediately behind the black pencil on the 11th segment, and often with a few long black hairs above it. Besides the pencils, there are also some long, irregular, whitish hairs projecting forwards over the head and backwards over the anus. *Legs* and *prolegs* very pale ferruginous, slightly obfuscated at tip.—When much less than half-grown, the head is generally not black but rufous, the black pencil on the 2nd segment is often only slightly tinged with black, and the pencils on the 11th and 12th segments are occasionally subobsolete or all whitish and untinged with black. Food-plants, oak, basswood, elm, &c ; very common near Rock Island, Illinois.

I am not perfectly sure that the larva of *tessellaris* has white pencils under its orange-colored ones, as *Antiphola* has under its black ones; but unless my recollection of last year's specimens deceives me, it has. Harris however makes no mention of any such white pencils, and the only specimens I was able to procure in 1864 had their pencils so mutilated, that it was difficult to decide the question from them with absolute certainty. In Illinoian specimens of *tessellaris* it will be recollected, that the color of the tufts that cover the body above is white, and not dark as in almost all *Antiphola;* and consequently in mutilated specimens it is difficult to distinguish the white pencils from the white tufts. It may be incidentally remarked here, that in Illinois *tessellaris* appears and disappears several weeks before *Antiphola*.

It will thus be seen that, so far as known at present, the only *perfectly* constant character that distinguishes the larva of *tessellaris* from that of *Antiphola*, is the color of its pencils being orange instead of black, and its food-plant being sycamore instead of oak, basswood, &c. Out of hundreds of *Antiphola* that have passed through my hands, there was indeed a single specimen, apparently freshly-moulted, as the pencils were incurved at the tip instead of being straight, that had those pencils white which ought to have been black; but on placing it in a breeding-cage, I found that the next day they had changed to their normal color, although those on the 2nd and 11th segments were much paler than usual. This was the same specimen before referred to as having changed its general color in confinement from white to gamboge yellowish.

If the pencils themselves in these two forms had been located on different segments, as in the first instance I had wrongly supposed, there could have been no doubt of the specific distinctness of the two, the differences being structural; but as the two forms only differ in the *color* of their pencils and not in their *location*, and the imagos are identical, it may well admit of a question whether they are not mere Phytophagic Varieties. It became desirable therefore to test this point in the manner recounted below, the principles of which it will be necessary first to explain.

When a species feeds indiscriminately upon several plants, individuals, that have fed for a certain period upon one of those plants, may be shifted upon another of the plants that they commonly feed on without injury to their health. I have done this in so many different cases with Lepidopterous larvæ, that I believe that, in their case at all events, it is a general law. For example, it is a common practice in England, and I have repeatedly done so when a boy, to feed the common silkworm when it first hatches out on lettuce leaves, and afterwards to change its food to mulberry leaves. Yet the insect thrives just as well, and spins up just as certainly under this treatment, as if it had been fed on mulberry leaves throughout. Lepidopterous larvæ will even sometimes voluntarily shift, from a plant of one family to another of a very widely distinct family. Several years ago I had, in the same cage, about a score half-grown larvæ of *Spilosoma virginica* Fab. feeding on apple leaves, and by the side of them several larvæ of *Pyrameis huntera* Sm. Abb. feeding on sunflower leaves. To my great surprise the former all suddenly quitted the apple-leaves for the sunflower-leaves, and I finished them on that plant and they, most of them, developed next year into the imago.

In confirmation of these views, Mr. Edwards, to whom I had referred for his opinion on this subject, writes to me as follows:—"I have often found that where I had one larva, say of *excæcata*, from the elm and another of the same from the cherry, and put food for both in the same vase, the two would be probably both of them on the cherry soon after. I have often changed the food-plant, when the one on which I found a larva was inconvenient to procure, for one nearer the house that I knew it liked. I have collected larvæ of *Limacodes* from oak, hickory, wild cherry and cherry, and have put the lot on a hickory or oak near my house. They did just as well."

On general principles, therefore, if *Antiphola* and *tessellaris* were mere Phytophagic Varieties, and not Phytophagic Species, it must be obvious that it would be possible to feed *tessellaris* on oak-leaves and *Antiphola* on sycamore-leaves without injury to their health; and in that case we might expect that the pencils of the one would more or less partially assume the color peculiar to the pencils of the other. Owing to the very great scarcity of almost all species of insects in 1864, I was unable to procure a sufficient number of individuals to try such experiments on a large scale; but such as they are, the results of my experiments, as extracted from my Journal, are given below. Since it is possible that on the supposition of *tessellaris* being identical with *Antiphola*, or, in other words, that they are mere Phytophagic Varieties of one species, there might be some peculiarity in the constitution of that species, causing it to deviate from the general law, and suffer in its health or even die from change of food, I also tried the experiment of feeding upon oak-leaves *Antiphola* that had been found upon basswood, and feeding upon basswood-leaves *Antiphola* which had been found upon oak. The results given below show that it is possible to so shift them, though not perhaps with perfect impunity, and that a basswood-feeding *Antiphola* lived for at least 12 days upon oak-leaves, and an oak-feeding *Antiphola* grew and flourished for 22 days upon basswood leaves, and two days afterwards spun up. In all these cases, except where otherwise specified, the larvæ were well attended to and the leaves not suffered to wilt.

Breeding-cage No. 1. Food-plant *oak*. This was a large cage containing nearly two cubic feet of space, with 3 or 4 inches of earth at the bottom and the top and sides of wire-gauze, so that there was no possibility of any but very minute larvæ escaping. It contained already, on Sept. 6, several score of larvæ of many different species, but of course no *Halesidota*, and I added others subsequently.

Sept 6. Placed in it 4 *H. Antiphola* taken off basswood, all lively, one ¼-grown, two ½-grown and one ¾-grown.

Sept. 9. Shifted on to fresh leaves. Found two lively *Antiphola;* the other two had disappeared.

Sept 12. Shifted. Found two lively *Antiphola.*

Sept. 14. Shifted. Found one lively *Antiphola;* the other one had disappeared.

Sept. 18. Shifted. Found one lively *Antiphola,* but it had not grown perceptibly since Sept 14.

Sept. 22. Shifted. The one remaining *Antiphola* had disappeared.

As I had several larvæ that had spun up among some dry leaves at the bottom of this cage, I did not search among the dry leaves for dead *Antiphola.* The missing ones might therefore have died of the change of food, or they might have been ichneumonised, or the larger ones might have spun up, or they might have been killed by some of the other larvæ in the cage, which, according to Rev. Mr. Green in his book on "Pupa-digging" is not an unusual circumstance with certain lepidopterous larvæ, or I might possibly have thrown them out by an oversight in changing the leaves; but they could not have escaped through the wire-gauze.

Breeding-cage No. 3. Food-plant *bass*. This, like all the following ones, contained over a cubic foot of space, with the sides and top of musketo-bar, so that occasionally larvæ would make their escape from it by boring through the musketo-bar. There was no earth at the bottom, and only 3 or 4 other larvæ in it, besides the *Antiphola*.

Sept. 5. Placed in it three ½-grown *Antiphola* taken off the oak, all lively.

Sept. 6. Added three more *Antiphola* taken off the oak, two ½-grown and one ¾-grown, all in good order.

Sept. 9. Shifted. Found 3 *Antiphola;* the other 3 had disappeared, and their bodies were nowhere to be seen in the cage. The leaves had partially dried up.

Sept. 10. Found only one *Antiphola;* the other two had disappeared.

Sept. 11—27. The same *Antiphola* throve and grew finely. Sept. 28 it quit feeding and shed its pencils and by Sept. 30 it had spun up.

I believe the 5 missing *Antiphola* in this cage escaped through the musketo-bar, as I found a stray one at large in the room where I keep my breeding-cages on Sept. 3, and two stray ones on Sept. 10. They certainly did not die in the cage, for every time that I shifted the leaves in all the cages but No. 1, I searched carefully for any dead larvæ.

Breeding-cage No. 4. Food-plant *sycamore*. There was no earth at the bottom of this cage, but there were a dozen or two very restless notodontide larvæ in it, that were continually boring through the musketo-bar and escaping.

Sept. 1. Placed in it two lively ¾-grown *Antiphola*, one taken off the oak and another off the elm or possibly the oak.

Sept. 2. Added 3 lively *Antiphola* taken off the oak, one ½-grown and two ¾-grown.

Sept. 3. Returned a stray *Antiphola*, which must have escaped from this cage, as at this date I had no *Antiphola* in any other cage.

Sept. 4. Shifted. Found two living ½-grown *Antiphola*, one of which had just moulted, and found also one DEAD. Two must have escaped, for their bodies were not to be found. Added from Cage No. 1 the abnormal oak-feeding *Antiphola* referred to above, (p. 414) which had now acquired black pencils.

Sept. 5. Added three lively ¾-grown *Antiphola* taken on the oak.

Sept. 9. Shifted. Found three lively *Antiphola*, and also one half-dead and one DEAD. One must have escaped.

Sept. 10. Shifted. Found three living *Antiphola;* the half-dead one was now completely DEAD. Three hours after shifting found three stray *Antiphola* in the room, which had apparently escaped from the cage, and replaced them. In order to identify them, however, I clipped off the tips of their right pencils.

Sept. 11. Noticed one of the clipped *Antiphola* was half-dead.

Sept. 12. The half-dead *Antiphola* was now completely DEAD.

Sept. 13. Shifted. Found no *Antiphola* either dead or alive. Two must have escaped.

Breeding-cage No. 6. Food-plant *sycamore*. There was no earth at the bottom of this cage, and only two or three peaceable larvæ in it on Sept. 13.

Sept. 13. Placed in it one *Antiphola* captured on the oak.

Sept. 14. Added three lively *Antiphola* captured on the oak, one less than ½-grown and two ¾-grown. The one placed there Sept. 13 was still in the cage.

Sept. 15. Shifted. Found three *Antiphola*, including the small one. One of the larger ones had disappeared.

Sept. 17. Shifted. Found three *Antiphola*, including the small one, which was dull and sluggish.

Sept. 19. Shifted. One of the larger *Antiphola* had moulted and was sluggish, the other one was lively. The small one was DEAD.

Sept. 21. Shifted. One of the two remaining *Antiphola* was half-dead, the other one was DEAD.

Sept. 22. The half-dead *Antiphola* was quite DEAD.

Breeding-cage No. 3. Food-plant *oak*. There were 2 or 3 inches of earth at the bottom of this cage, and about a dozen larvæ, besides *tessellaris*, were placed in it from time to time in the forepart of September.

Aug. 31. Placed in it three *tessellaris* captured on the sycamore, two ½-grown and one ¾-grown. They were lively, but their pencils had been badly mutilated in the handling.

Sept. 4. Shifted. All three *tessellaris* had the white tufts on their bodies changed to a decided dirty-white, as in some varieties of *Antiphola*. Their heads were still rufous, and what remained of their pencils was orange and continued so to the last. The large one was vigorous, the two small ones very dull and sluggish.

Sept. 6. Noticed one *tessellaris* DEAD in the cage.

Sept. 9. Shifted. Found one *tessellaris* DEAD; the other one had disappeared and was nowhere to be found.

It thus appears that out of 13 oak and elm feeding *Antiphola* compelled to feed on sycamore leaves, no less than 7 died in from 3 to 7 or possibly 10 days, and 6 either escaped, or were eaten by other larvæ, or possibly might have been thrown out by an oversight in shifting. As they were all well tended and carefully handled, the inference is unavoidable, that *Antiphola*, though it naturally feeds upon a great variety of trees, cannot as a general rule be brought to feed upon sycamore without suffering death in consequence, and therefore that it is not a mere Phytophagic Variety of *tessellaris*. In no one instance could I perceive that any of these *Antiphola* approximated in the color of their tufts towards *tessellaris*, or that their black pencils approximated in the least degree towards the orange pencils of *tessellaris*. It further appears that out of 3 sycamore-feeding *tessellaris* compelled to feed upon oak-leaves, one died in 6 days and another in 9 days, and the remaining one disappeared; and that four days after they had had their food changed to oak, the tufts on their bodies approximated very remarkably in color to those of *Antiphola*, though their pencils did not. From these facts we may infer that *tessellaris* is not a mere Phytophagic Variety of *Antiphola*.

It is an easy matter for the believers in the Creative Theory to cut the knot, instead of untying it, by asserting that *tessellaris* and *Antiphola* are simply distinct species in their sense of the term, and that they have fed respectively upon the sycamore and upon oak, bass, elm, &c. ever since their original creation. But in that case, assuming the truth of the Creative Theory, how are we to account for the absolute identity of their imagos, and for the further very remarkable fact that these two forms are subject, as I have shown, p. 288, to six or eight distinct variations, which occur equally in each of them? If the coloration of the two forms was plain and simple and without any definite and elaborate pattern, as is the case for example in the dipterous genus *Cecidomyia*, there would be nothing so very wonderful in two distinct species being undistinguishable in the imago, as we find to be sometimes the case in *Cecidomyia*. But the coloration, and more especially the design or pattern of their wings, is so complicated and so diversified, that I could as soon believe that the same pattern could be reproduced twice over in a large and well-filled Kaleidoscope, or that, after distributing the types of a book, they could be re-arranged so as to produce a fac-simile edition, undistinguishable from the first, or that the same identical species had been created twice over in two separate habitats or at two separate geological epochs, as that these two forms were created originally as distinct species by the fiat of the Creative Power. On comparing the two imagos, the impression is irresistible to every unbiassed mind, that there must be a genetic connection between them, or in other words, that they are what I have called Phytophagic Species; which is further confirmed by the fact of the 3 sycamore-feeding *tessellaris* approximating in the coloration of their tufts to *Antiphola*, after feeding only for four days upon oak-leaves. They certainly cannot be mere Phytophagic Varieties, for if they were, out of the sixteen individuals that I endeavored to compel to change their food from sycamore to oak or *vice versa*, some one of the number would have suffered the change of food without dying; as, out of the six oak-feeding *Antiphola* in Cage No 5, one grew and flourished for 22 days and finally spun up, though its food was changed to bass, and none of the remaining five died in confinement.

Clytus (arhopalus) pictus Drury (pp. 296—7). I have here demonstrated, that the race that has the habit of preying upon the hickory is distinct from the race that has the habit of preying upon the locust; or, which amounts to the same thing, that a ♀ *pictus* bred in the hickory does not oviposit in the locust. I have also shown that there is a very remarkable difference in their habits, the locust-feeding race, as is well known, coming out in September, and the hickory-feeding race, according to Mr. Bland, in the spring (p. 297, note). Mr. Bland, in reply to some recent enquiries on the subject, has been kind enough to inform me, that "the spring species can be found in abundance upon the hickory the first warm days in May and June, and that it appears to confine itself to this tree; while the fall species appears upon the locust, and can also be taken upon various plants that are in blossom, in September." He adds that "he has made diligent enquiry among the Philadelphia collectors in regard to the time of capture, and they *all* assert that they lose sight of *Arhopalus pictus* from the middle of June until September." Up to the autumn of 1864 I was not aware that any specific distinctions existed between the imagos of these two races, but I have recently ascertained that there are some very remarkable ones in the ♂, though neither Mr. Bland nor myself can discover any in the ♀. I have now before me of the hickory-feeding race four ♂ ♂ three ♀ ♀, one of these ♂ ♂ split by myself out of a stick of hickory wood seven years ago, the other ♂ ♂ ♀ ♀ obligingly communicated to me by Mr. Bland. I have also before me of the locust-feeding race 15 ♂ ♂ 4 ♀ ♀, viz. 13 ♂ ♂ taken *in coitu*, that there might be no possible doubt of their sex, on flowers in September, 2 ♂ ♂ taken in September on the trunk of a locust, 3 ♀ ♀ taken on flowers in September, and 1 ♀ received from Mr. Bland and labelled as belonging to the locust-feeding race. The following distinctions between the ♂ ♂ of the two forms are perfectly constant according to the types, except where otherwise stated.

Hickory-feeding ♂.	*Locust-feeding* ♂.
1. Antennæ, when relaxed and laid close and straight along the back, reaching beyond the tip of the elytra by the whole length of the terminal joint (11.)	1. Antennæ, when relaxed and laid close and straight along the back, even in the specimen which has the longest ones, not attaining the tip of the elytra by a space equal in length to the two terminal joints (10 and 11.)
2. Antennæ from ½ more robust to twice as robust, especially towards the base.	2. Antennæ much less robust. except the few last joints, and less tapered from base to tip.
3. Terminal or 11th joint of antennæ full ½ longer than the penultimate, and composed of two portions connected by an indistinct connate suture foreshadowing a 12th joint, (as in *Purpuricenus* ♂ and in *Tragidion annulatum* ♂ Lec.,) which suture is more distinct on the inferior surface. The basal portion of 11th joint as long as joint 10, the terminal portion, which is suddenly slenderer from base to tip, more than ½ as long as joint 10.*	3. Terminal or 11th joint of antennæ scarcely ⅓ or ¼ longer than the penultimate, the division into two portions barely discoverable, and the terminal portion not suddenly slenderer from base to tip.
4. Elytra widened at base and tapered towards their tip, so that the two together just before the extreme tip equal the basal width of one of them.*	4. Elytra much less tapered and shaped exactly as in the ♀ of both the two races, i. e. with the lateral edges subparallel.
5. The 2nd or W-shaped band on the elytra in two of the Philadelphia specimens and the Illinois specimen whitish, in the other Philadelphia specimen centrally whitish but decidedly varied with yellow on the two exterior arms of the W.†	5. The W-shaped band on the elytra colored yellow, exactly like the other bands, in all my 15 specimens.
6. Legs proportionally ⅓—½ longer and stouter than in ♀.	6. Legs proportionally no longer or stouter than in ♀.

It is a suggestive fact, that although the ♂ antennæ differ so remarkably in the two races both in length, robustness and structure, the ♀ antennæ are exactly alike, being in both races a little more than ½ as long as the body, with the terminal joint equal in length to the penultimate or perhaps very slightly longer, and no perceptible difference in the robustness of the whole antenna. The general appearance of the two ♀ ♀ and of the ♂ of the locust-feeding race is very similar, but, owing to the shape of the elytra, the ♂ of the hickory-feeding race has a different and *Leptura*-like habit. So closely indeed does the ♂ of the locust-feeding race resemble the ♀ of both races, that until a recent period I had always supposed, that all my specimens of that race—some 30 or 40 in number—were ♀ ♀, and that the unique ♂ which I possessed of the hickory-feeding race was the normal ♂ of the species. In all the ♀ ♀ of both races the W-shaped band on the elytra is as yellow as the other bands. Whether there is any distinction in the larva state is unknown, as the larva of the locust-feeding form has never yet been critically examined. Here again, as in the two *Halesidota*, we find the colorational pattern of the imagos so complicated and diversified, that it is impossible to believe that the two forms have no genetic connection, for the same reasons referred to in the case of the *Halesidota*. That they cannot be mere Phytophagic Varieties, has, I think, been most clearly demonstrated in the paper already quoted.

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* I am indebted to Mr. Bland for directing my attention to these two characters.

† Dr. Fitch says that it was reported to him that individuals reared in the black walnut had the yellow bands on the body more or less white. (*N. Y. Rep.* II. §329. With the exception noted in the text they are all bright yellow in the ♂ ♂ bred from the hickory. Mr. Bland remarks that this whiteness of the bands is the exception and not the rule, as it only occurs occasionally at Philadelphia.

Whether we choose to consider the locust-feeding and the hickory-feeding forms of this insect as Phytophagic Species, or as distinct species in the sense given to that term by the believers in the Creative Theory, it will be obviously both convenient and necessary to have a separate name for each. It is a doubtful and disputed question in Entomological Archæology, whether Drury's name *pictus* or Forster's name *robiniæ* has the priority, as Drury was the first to describe the insect and Forster the first to name it. We may therefore, with even-handed justice, appropriate the name of *robiniæ* to the locust-feeding race with short and slender ♂ antennæ and legs which appears in September, and the name of *pictus* to the hickory-feeding race with long and robust ♂ antennæ and legs which appears in May and June.

SPHINGICAMPA DISTIGMA Walsh and DRYOCAMPA BICOLOR Harris (pp. 290—294). I have shown here, though there is a certain degree of doubt attaching to the proof, that the ♂ of the former of these two species is undistinguishable from the ♂ of the latter, the ♀ of which is unknown, while the larva of the former is sphingiform and entirely unlike all known Dryocampa larvæ, and also unlike the aberrant Dryocampade genus *Ceratocampa*, in the abdominal thorns being normally placed, not on every segment, but on alternate segments, and the supposed larva of the latter had the normal Dryocampa form. I have this year met with two larvæ—one of which died and has been preserved in alcohol, and the other either went underground or escaped*—which I believe to be identical with that from which I bred, or supposed that I bred, *D. bicolor*. I am well acquainted with the larvæ of *D. senatoria* Sm. Abb. and *D. stigma* Fabr. and they are certainly quite distinct from my two larvæ; neither do my two larvæ agree with the pretty full description of the larva of *D. pellucida* Sm. Abb. given by Dr. Fitch, (*N. Y. Rep.* II. § 324,) the upper dark stripe which is sanguineous in my larva being "dull brownish" in his, and the lower dark stripe, which is also sanguineous in my larva, being "dark olive green or blackish" in his, and there being a "broad dull yellowish stripe" immediately below the spiracles and above the lower dark stripe in his, which has no existence in mine, and a "narrow blackish line on the middle of the back" in his which is not found in mine. There is also a difference in the number of the spines, Dr. Fitch assigning only *six* spines to each segment, instead of *six* to some and *eight* to others; but this is probably nothing but an oversight, as he assigns the same number to *senatoria*, which, unless my memory deceives me, is thorned like my larva on joints 2—11. The only other known N. A. species of *Dryocampa* are *imperialis* Drury, the larva of which is quite different from mine, and *rubicunda* Fabr., the larva of which is undescribed and the imago of which, so far as I am aware, does not occur near Rock Island. I subjoin a full description of my two larvæ, and also a description of the larva of *rubicunda*, with which I have been favored by Mr. J. A. Lintner. It will be seen from comparing these two descriptions, that my larva differs from that of *rubicunda* in the horns of the 2nd segment being proportionally much longer, (for if they were proportionally as short as in *rubicunda* they would be not quite .09 inch long instead of .20 inch,) in the different arrangement and different structure of the spines, and in having *four sanguineous* stripes instead of *seven dark green* ones. It cannot therefore be *rubicunda*, and hence it would seem to follow that it must be either *bicolor* or some species hitherto undescribed both in the larva and imago states. It is observable that Dr. Harris describes the larva of *pellucida*, of which he professes to have seen only a single specimen, as "pea-green, shaded on the back and sides with red, longitudinally striped with very pale yellowish green, and armed with black thorns," and adds that "it resembles *senatoria* in everything but color," whence it may be inferred that it has about *seven* dark stripes, instead of *four* dark stripes, as *pellucida* is described by Dr. Fitch. I strongly suspect that Dr. Harris described the larva of *rubicunda* as the larva of *pellucida*, taking the darker green as the ground color and the paler green as the color of the stripes, instead of *vice versa* as in Mr. Lintner's description of *rubicunda*. In any case Dr. Harris's description of the larva of *pellucida* differs altogether too widely from Dr. Fitch's description to apply to the same species; for I observe that in the larvæ both of *senatoria* and *stigma* the range of variation is by no means wide, and consequently, according to what I have called the "Law of Equable Variability," we may presume that the range of variation will not be wide in the larva of the closely allied *pellucida*. (*Proc. Ent. Soc. Phila.* II. p. 213.)*

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* It turned out unfortunately, on emptying the earth from the breeding-cage, that it must have escaped.—Nov. 14, 1864.

There is another reason, of no great weight perhaps, but still of some weight, why my two larvæ cannot belong to *pellucida*—the only known N. A. species, except *bicolor*, to which they can with any probability be referred. It is often, though by no means universally, the case, that when bright colors occur in the larva the same colors occur also in the imago. For example, the larva of *Deiopeia bella* Drury is said by Drury to be yellow and white dotted with black, like the front wings of the imago; the larva of *Papilio Asterias* Fab. is marked with yellow and black like the imago; and merely from studying the colors of the imago, I foretold that the larva of *Doryphora 10-lineata* Say "would probably

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*I see from the Preface to the *Iconographie des Coquilles Tertiaires*, published in 1845 by Prof. Agassiz (p. 4), that he practically recognizes the validity of this Law in Conchology; and I learn from a Botanical article in the *Nat. Hist. Review* (1863, p. 192), that very many Botanists practically recognize it at the present day. Important, however, as the Law is, it does not appear to have previously received any name.

be yellow with black spots and markings on its body," which has since turned out to be literally correct. (*Valley Farmer*, July 1862, p. 210 and Sept. 1864, p. 273.) Now my two larvæ are quadrivittate with sanguineous, and the imago of *pellucida* is of a uniform brownish ochreous color, without any sanguineous or rosy-red markings. On the other hand the only N. A. *Dryocampa* that are strongly marked in the imago with sanguineous or rosy-red or dull purple are *imperialis*, *rubicunda* and *bicolor*. *Imperialis* is out of the question, and we know from Mr. Lintner's very full and precise description that my larva cannot possibly be *rubicunda*, whence by the method of exhaustion I infer that it is probably *bicolor*. The fact that Harris describes the supposed larva of *pellucida* as "shaded on the back and sides with red" is another reason why we may conclude that his larva really belonged to *rubicunda* and not to *pellucida*. It is very true that the specimens from which Mr. Lintner drew his description were not thus shaded, but just so some larvæ of *D. imperialis* are "slightly tinged with red on the back," and some are not. (Harris *Inj. Ins.* p. 404.) For the presence or non-presence of a *mere shade* is unimportant when compared with the presence or non-presence of a *stripe*.

In regard to the validity of my new genus *Sphingicampa*, which differs from *Dryocampa*, much as *Attacus* differs from *Saturnia*, in the ♀ antennæ being basally feathered, though less widely so than the ♂ antennæ, Mr. Grote informs me that Herrick Schæffer has figured and described a great number of South American *Dryocampa* which are distinguished by the same peculiarity, but the larvæ of which are at present unknown. Hence it would seem that *Sphingicampa* is more peculiarly a South American genus. Mr. Grote also informs me, that the imago which I described with some doubt (pp. 298–9) as that of *Limacodes scapha* Harris, is, to his personal knowledge, correctly referable to that species.

Dryocampa bicolor? Harris. **Larva.** Length, when apparently, judging from the size of the head, it was just moulted, 1.20 inch. *Head* greenish yellow, with a brown-black spot bordering the eyes, which are 4 or 5 in number on each side and arranged in a circle open behind; mouth a little varied with brown-black. *Body* very pale greenish-brown, thickly covered and frosted over with small, irregularly placed, whitish granules, none of which are transversely arranged as they are in *stigma*. A pair of dorsal sanguineous stripes, and a lateral sanguineous stripe placed immediately below the line of the spiracles, each of these four sanguineous stripes being equal in breadth to one-tenth of the length over the back from proleg to proleg, and the three pale greenish brown stripes between them being each twice as broad as they are: the sanguineous stripes fading out on the anterior submargin of joint 12, and the remaining part of 12 being greenish yellow. Spiracles large, vertically elongate, and black edged by yellowish. On joint 1 behind the head 6 equidistant black tubercles, the outer one pointed at tip, and beneath them a lateral black thorn, all 8 transversely arranged. Joints 2—11 all with 6 transversely-arranged, medial, smooth, acute, black thorns, .03—.05 inch long and sometimes with a few white granules towards their base, two thorns placed between the dorsal sanguineous stripes, one lateral one just outside each dorsal sanguineous stripe, and another lateral one in the lateral sanguineous stripe. On joint 2 the two dorsal thorns are replaced by long, slender, recurved, smooth, obtuse, black horns directed forwards, .20 inch long with a few white granules on their lower half; and on joint 3 the two dorsal thorns are acutely bifid at tip. On joints 2—5 and 10, in addition to the above 6 thorns, there is another one beneath the lateral sanguineous stripe, so that these joints have 8 thorns, all transversely arranged. Joint 12 with one central, dorsal, bifurcate thorn, similar to the two dorsal ones on joint 3, one lateral one on the edge of the superior surface of the joint, and another lateral one below the line of the lateral sanguineous stripe, all 5 black with a few basal white granules and arranged transversely on the anterior submargin, and behind them, half-way to the tip of the lateral edge of the superior surface of the joint, a single black thorn, before and behind which are a few acute whitish granules, and at the tip two greenish yellow thorns tipped with black and directed backwards. Venter very pale greenish brown. *Legs* greenish yellow, the claws brown-black; prolegs pale greenish brown, with a large brown-black spot on their lower exterior surface.—Described from two living specimens. *Food-plant* oak.

Dryocampa rubicunda Fabr. Larva. (Described by J. A. Lintner.) Length 1.70 inch. *Head* reddish-brown; eyes on a crescent black spot. *Body* cylindrical, apple-green, closely dotted with minute, whitish, acute granulations, with a darker green narrow dorsal stripe, and broader subdorsal, lateral and stigmatal stripes, the stigmatal stripe less distinct than the others. Segment 1 with four black tubercles on the collar, the central ones transversely oval, the outer ones subtriangular, a spine in front of the stigma and another at the base of the leg. Segments 2—11 with a substigmatal row of acute, prominent, black spines pointing backwards; a lateral row of shorter ones on the inferior margin of the lateral stripe; a subdorsal row of still shorter ones on the superior margin of the subdorsal stripe, [marked] with whitish at base superiorly; and a ventral row on and in range with the external base of the legs and prolegs, those of the prolegs (segments 6—9) quite small, the other seven (segments 1—5, 10 & 11) nearly as long as the substigmatal ones, except those on the terminal pair of legs, of which there are two on the base of each, which are quite minute. All of the above spines black, the three superior ones in range transversely on the anterior portion of the segment, the substigmatal ones on the middle of the segment. In addition to the above, from the 4th to the 12th segment inclusive.

there is a row of whitish, black-tipped, short spines on the inferior margin of the subdorsal stripe, placed two-thirds of the way to the tip of each segment. Segment 2 has the two subdorsal spines replaced by two black, blunt, spinous horns, placed below the subdorsal stripe and one-eighth of an inch long. The four superior spines of segment 11 more prominent than the corresponding ones of the other segments. Segment 12 with a slightly bifurcate spine on the dorsal line, the size of the lateral ones of the eleventh segment; another in range with the stigmata, the size of the substigmatal ones and having a small branch posteriorly; a small intermediate one ranging with the lateral line; another of the same size ranging with the substigmatal line; and a ventral one similar to and ranging with the ventral spines of segments 10 and 11; making 9 spines on this segment, nearly ranging transversely. Caudal plate triangular, margined externally with eight black spines, the six anterior ones short, the two terminal ones green at base, larger and pointing backward. Stigmata black. *Legs* tipped with black, the anterior pair with a transversely subelliptic black spot on their posterior base, the second pair with a dot similarly placed.—Feeds on sugar-maple.

From the facts referred to above and those recorded by me elsewhere, we may construct the following almost unbroken series, from the first dawnings of the Phytophagic Variety to the full development of the Phytophagic Species.

1st. Difference of food, even when the food-plant belongs to widely distinct botanical families, is accompanied by no differences whatever, either in the larva, pupa or imago state.—*Attacus Cecropia* Lin., *Dryocampa imperialis* Drury, *Lachnus Caryæ* Harris, (*Proc. Ent Soc. Phil.* I. p. 303,) and hundreds of other species.

2nd. Difference of food is accompanied by a marked difference in the color of the silk-producing secretions.—*Bombyx mori* Lin., the common silkworm.

3rd. Difference of food is accompanied by a tendency towards the obliteration of the normal dark markings in the imago.—*Haltica alternata* Illig.

4th. Difference of food is accompanied by marked, but not perfectly constant, colorational differences in the larva, but none whatever in the ♂ ♀ imago.—*Datana ministra* Drury.

5th. Difference of food is accompanied by a marked and perfectly constant difference in the size of the imago.—*Chrysomela scalaris* Lec.

6th. Difference of food is accompanied by a marked difference in the chemical properties of the gall-producing secretions, the external characters of the ♂ ♀ imago remaining identical.—*Cynips q. spongifica* O. S. and *C. q. inanis* O. S.

7th. Difference of food is accompanied by a slight, but constant change in the coloration of the abdomen of the ♂ ♀ imago, and by a very slight change in the chemical properties of the gall-producing secretions, the galls of the two insects, though typically somewhat distinct, being connected by intermediate grades in the case of the latter.—*Cynips q. punctata* Bassett and *C. q. podagræ* Walsh.

8th. Difference of food is accompanied by one marked and perfectly constant colorational difference, and others which are not perfectly constant, in the larva, but none whatever in the ♂ ♀ imago.—*Halesidota tessellaris* Sm. Abb. and *H. Antiphola* Walsh.

9th. Difference of food is accompanied by several slight but constant structural differences in the ♂ imago, but none whatever in the ♀ imago.—*Clytus robiniæ* Forst. and *Cl. pictus* Drury.

10th. Difference of food is accompanied by a slight but constant structural difference in both ♂ and ♀ imago.—1. *Tingis tiliæ* n. sp. and *T. amorphæ* n. sp. 2. (Doubtful.) *Diapheromera femorata* Say and *D. Velii* n. sp.

11. (Doubtful.) Difference of food is accompanied by very strong structural and colorational differences in the larva and in all probability by a constant structural difference of generic value in the ♀ imago, the ♂ imagos being to all external appearances identical, and the two insects belonging to different genera.—*Sphingicampa distigma* ♂ ♀ Walsh and *Dryocampa bicolor* ♂ Harris.

12th. Difference of food is accompanied by marked and constant differences, either colorational, or structural, or both, in the larva, pupa and imago states.—*Halesidota tessellaris* Sm. Abb. and *H. caryæ* Harris, and hundreds of species belonging to the same genus and commonly considered as distinct species.

The constitution of the human mind is such, that the same evidence carries with it very different degrees of weight, when presented to different intellects. Others will no doubt draw different conclusions from the facts catalogued above; but for my own part, as on the most careful consideration I am unable to draw any definite line in the above series, and to say with certainty that here end the Varieties and here begin the Species, I am therefore irresistibly led to believe, that the former gradually strengthen and become developed into the latter, and that the difference between them is merely one of mode and degree. If a savage from some newly-discovered island in the Pacific Ocean were shown for the first time in his life a large herd of horned cattle, containing newly-born calves, half-grown calves, yearlings, heifers, steers, cows and bulls of all sizes and ages, he would naturally, I think, arrive at the conclusion that they were all modifications of one animal, though he had no opportunity, as we have, to watch from day to day the calf develop into the yearling, the yearling into the heifer, and the heifer into the cow. So with the gradual development of the Variety into the Species. We cannot, from the shortness of human life, see the *same* identical species develop gradually from century to century, first into slight varieties, then into marked varieties, then into geographical or phytophagic races, then into new species; but in one and the same year we may see all the stages of development, with all the possible intermediate grades, in *different* species; and to shut our eyes to the validity of this the only possible proof under the circumstances, and to maintain that Species were created and Varieties have made themselves, and that the two categories are therefore essentially distinct, is as if the imaginary savage from the South Seas, ignoring or overlooking the presence of the yearlings and heifers, were to come to the conclusion that calves and cows are distinct species of animals. Darwin never spoke a truer word than when, referring to certain naturalists who believed in the essential difference between Species and Varieties, and yet published the very same identical form one year as a Variety and the next year as a Species, he said that "the day will come, when this will be given as a curious illustration of the blindness of preconceived opinion." (*Orig. Sp.* p. 419. Am. edit.)

ROCK ISLAND, ILLINOIS, October 24, 1864.

POSTSCRIPT.

In my Paper in the *Proc. Bost. Soc. Nat. Hist.* (p. 289), referring to the fact that Dr. Harris says that the Caterpillar of *Halesidota tessellaris* "is not correctly represented in Smith and Abbott's *Insects of Georgia*," I suggested that "possibly the Caterpillar of *Antiphola* may be there represented." I have recently heard from Mr. Grote as follows, which fully confirms that conjecture.

"The figure of *Halesidota tessellaris* in the larval state, as given by Abbott and Smith, represents the hairs, and so far as perceivable the body, as of a dull, ochraceous brownish color. The dorsal tufts show a superior dark brown shade and a blackish line. The lobes of the head are bluish black; the legs with a reddish shade. The four long anterior pencils are blackish with a faint brownish tinge, and the two terminal pencils are similarly colored. The larva is represented on Fagus ferruginea [beech], and is stated also to be found on hornbeam and plum trees."

Hence it is, I think, very evident that *tessellaris* Abb. Sm. is identical with my *Antiphola*, and *tessellaris* Harris *non* Abb. Sm. a hitherto unnamed (Phytophagic) species, for which I propose the name of *Harrisii*. The black and not rufous head, the black and not orange-colored pencils, and the ochraceous brownish and not milk-white hair of the larva of *tessellaris* Sm. Abb. seem to settle that point effectually. Moreover that larva is not stated to feed on sycamore (Platanus occidentalis), on which alone the *tessellaris* of Harris is known to feed according to Harris, Edwards, Lintner and myself, but on a variety of other trees like my *Antiphola*.

We can understand now, I think, why Dr. Harris described the larva of his *tessellaris* as "yellowish or straw-colored," whereas it is in reality milk-white. He evidently perceived the apparent identity of his *tessellaris* (imago) with the *tessellaris* (imago) of Abbott and Smith, and very naturally supposing the larvæ to be also identical, modified his description of the larva so as to make it something intermediate between the two species.—Nov. 16, 1864.

ERRATUM.

Page 414, lines 10 and 11, for "white pencils" read "white pencils on the 2nd segment."

Description of the Female of ARGYNNIS DIANA.

BY W. H. EDWARDS, NEWBURGH, N. Y.

Argynnis Diana, ♂ Cramer, pl. 98.
Say, Am. Ent. 17.

Female.—Expands nearly four inches.

Upper side black: primaries have upon their outer third three rows of bluish white spots; the marginal small, rounded; the submarginal rectangular, wanting two spots on the costa; the median of irregular patches, often blue; on the costa a bluish white patch divided by the nervures.

Secondaries have a marginal series of bluish white bars, between and reaching to the nervures, the three or four posterior ones broadest and bisected by a black line; a submarginal metallic blue band occupies one-third of the wing, divided by the nervures into oblong spots, each of which, except the two outer ones, has a rounded black spot near its anterior edge.

Fringes of both wings white, black at the tips of the nervules.

Under side of primaries black, with a scarcely perceptible greenish tint; apex and hind margin brown; the marginal and median rows of spots are separated, as also the costal spot, which is much enlarged; the submarginal row is wanting; anterior to the median is a row of elongated bluish spots; in the cell three spots, the largest rhomboidal, the others triangular: a silvery apical spot.

Secondaries have the basal two-thirds dark red brown, edged without by an incomplete silvery line, which, at the extremities on the margins, expands into triangular spots; this line is sometimes wholly wanting; a silvery spot edged with black near the base of the costal nervure, as in the male; within the arc a black stripe; the outer third of the wing blackish brown; hind margin edged with a gray band, above which are narrow silvery crescents.

Body black above; dark red brown below.

From thirty specimens taken upon the Kanawha and Elk Rivers, West Virginia, between the 20th and 31st of August, 1864. In two of these specimens the band upon secondaries is green instead of blue.

This remarkable butterfly appears to have been hitherto overlooked.

Cramer figured the male from a specimen brought from Virginia. Say also figured the male, and mentions that he had taken the species in Georgia, Florida, Arkansas and Missouri. The description of Boisduval and LeConte is taken from Cramer's figure, they never having seen the species. No mention is made of the female by either of these authors. It is surprising that Say especially should not have seen it. Up to this time *Diana* male is the rarest of all the butterflies in our collections, and, indeed, I know of no collection that has it except that of Mr. Walsh, who has a single specimen, taken some years since, in Southern Illinois.

The male is conspicuous from the contrast between the blackish base of its wings and the clear yellow margin, and may be distinguished from *Cybele*, with which it associates, at a great distance. I first saw a single male hovering about the flowers of the "iron-weed,"(*Vernonia*——?) on the 20th of August last, near the banks of the Great Kanawha River, in West Virginia. Two days afterwards, in same vicinity, I came suddenly upon a large black and blue butterfly, feeding so quietly as to allow me to stand near it some seconds and watch its motions. It seemed to be a species of Limenitis, so much did it resemble *L. ursula* in color and markings. But in taking it I saw it was an Argynnis female, and the pattern of the under side left no doubt of its affinity to *Diana* male.

Now that my attention was attracted to this species, I found it not very uncommon, always when seen, upon or near the "iron-weed," which is very abundant upon the rich bottoms of that region during the month of August, and form the feeding ground of innumerable Papilios, Argynnides and Vanessas. The female is quite as conspicuous as the male, from its great size and brilliant metallic color.

In the course of a few days I had taken several of both sexes. In an excursion up Elk River, I found them comparatively plenty, and on one sunny afternoon in particular, as I rode along, I must have seen fifty, most of which were females. That afternoon I took seventeen, and altogether, between the 20th and 30th of the month, I took fourteen males and thirty females, finding the color constant in each sex. The males were all more or less ragged and broken, while the females were often still fresh. The males should be looked for from the 1st to the 10th of August, and the females from the 10th to the 20th, for, as collectors know, the males of most, if not all, species of butterflies appear some days earlier than the females, and disppear as much sooner.

That so large a butterfly should have escaped notice renders it not unlikely that other species remain to be discovered among the mountains of the Southern States, which have been little explored by entomologists.

That part of West Virginia is very rich in Lepidoptera, the configuration of the country compelling them to concentrate in the deep, warm valleys. Papilios *Turnus*, *Troilus*, *Philenor*, *Asterias* and *Marcellus* are seen in great numbers. The black variety of *Turnus* female (*Glaucus*) appeared to me as numerous as the males, and very much more so than the yellow. I saw one *P. Cresphontes* upon the "iron weed," but could not take it.

Of the Argynnides, *Cybele* was plenty, *Aphrodite* rare. *E. Claudia* was common. So also were the Vanessas *Antiopa*, *Atalanta*, *Huntera*, *Interrogationis*, *Progne* and *Comma*. *Terias Nicippe* was abundant; *T. Lisa* rare. *Colias Philodice* and *Pieris Protodice* abundant.

I also took *Apatura Celtis*, *Debis Portlandia*, *N. Sosybius*, *Eurythris* and *Gemma*. I saw no *Alope* or *Nephele*. *Eudamus Tityrus* is in great numbers. *Lycidas* rare. I saw but few of the smaller Hesperians. Of these, *Otho* was quite common. *Leonardus* I saw twice only. I took two of *Thecla Poeas*, much to my surprise, as this is supposed to be a strictly southern species.

In the month of June last, I saw in the Kanawha valley great numbers of Lycænidæ, especially of *Pseudargiolus*. About the 20th of the month I took nearly sixty specimens, four-fifths of which were fresh females. By the 20th the males of *Neglecta* and *Lucia* began to appear, but seemed comparatively rare. The resemblance of both sexes of *Pseudargiolus* in size and coloring of upper surface to *Argiolus* of Europe is very striking.

Limenitis ursula was abundant at that season, constantly to be seen upon the road, where it would collect in clusters. There is a variety of this species in which the blue shade is replaced by green in both sexes, and the female is as distinctly marked as the male. This is well represented in Abbot's figure. Perhaps one-third of these I took were of this green variety. In the Northern States the female of *ursula* has much less of the metallic shade than the male, and is sometimes quite black.

In these weeks I saw few Sphingidæ, though I do not doubt they are abundant in many species. Both in June and August I found the larvæ of *S. Hylæus* in every stage of growth, on the pawpaw. I also found that of *Juglandis*. *D. lineata* was seen flying about the flowers of the iron weed in company with the butterflies. The larvæ of *cingulata*, which feeds on the sweet potato, is well known there, and of *Carolina* and 5-*maculata*.

I did not collect in other orders, but saw enough to warrant the belief that the Kanawha is as rich in most of them as in Lepidoptera.

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Notes on the ARGYNNIDES of California.

BY W. H. EDWARDS.

On 21st April, 1862, Dr. Behr read before the Lyceum of Natural History of San Francisco, a paper on the Argynnides of California, which was published in the Journal of the Lyceum. In this paper was given a short diagnosis of each species then known, specified by numbers, as the author was uncertain; not having access to books of reference, which might have been before described. In a subsequent paper, read before the Lyceum in 1863, Dr. Behr gives names to three of these species, leaving No. 2 still unnamed. In one instance he seemed to me to have re-named an old species, viz: *Astarte*, of Doubleday (No. 4) instead of the species No. 5, as I was enabled to verify from comparing marked specimens sent me with Doubleday's figure. As these papers are little known to our lepidopterists, at the request of Dr. Behr, I have made an abstract of them, giving his descriptions to the new species and name to No. 2.

No. 1. ARGYNNIS CALIPPE, Boisduval: "the only Argynnis that is found near San Francisco, and it seems pretty generally distributed throughout the State."

No. 2. ARGYNNIS CORONIS, Behr in lit.

"Very similar to *Calippe*, but differs by the upper side being colored in the usual way of the genus, and not showing the pale lunulæ and spots of the disk like *Calippe*, which resembles, in this respect, more an *Euptoieta* than a true Argynnis. The lunulæ (below) are not triangular, nor are the silver spots of the intermediate fascia egg-shaped, as in *Calippe;* all the spots, with the costa and abdominal margin, silvered. This species is not very common."

No. 3. ARGYNNIS LETO, Behr.

"Wings of the male fulvous, fuscous at base; marked as in allied species; beneath, secondaries from the base to the middle of the wing, of a cinnamon color; the marginal lunules silvered; the intermediate fascia consisting of seven spots, and five towards the base, all silvered. This species is peculiar to the Western slope. The upper side of the male is like that of *Cybele* female, but the female has the wings black, with a band of white spots in the middle and of orange spots near the margin, as in *Idalia* male."

No. 4. ARGYNNIS ASTARTE, Doubleday.
Egleis, Boisduval in lit.

This species Dr. Behr subsequently called *Montivaga*, a name which he transfers to the following:

No. 5. ARGYNNIS MONTIVAGA, Behr.

"Resembles *Astarte*: the marginal spots silvered, the others dull white, more or less yellowish; marginal spots lunular; of the intermediate fascia oval; all edged with black on the radical side. This species is always found in mountainous regions, as is No. 4. It is more common than that species, and easily recognized by the black bordering of the spots of the intermediate fascia," (which is either wanting or very slight in Astarte) "their oval, not quadrangular shape, and the rounded form of the marginal spots."

No. 6. ARGYNNIS RUPESTRIS, Behr.

"Coloration of the upper side orange brown; markings as usual; underside similar to *Calippe*, but much darker, and the maculæ, where they have no silver, dark yellow; the saturated solution of the radical half of secondaries extended beyond the middle fascia."

No. 7. ARGYNNIS ADIASTE, Boisduval in lit.

"Upper side characterized by the absence of most of the usual markings in secondaries, so that they appear almost covered by the fiery brown that forms the ground; markings of the under side very indistinct; color of secondaries pale ferruginous, the ordinary spots scarcely paler than the rest; even the black bordering on the radical side of the spots common to all the species of this group, is here scarcely perceptible."

No. 8. ARGYNNIS MONTICOLA, Behr.
A. Zerene, Boisduval.

"Under side of the hind wings of a deep brown, approaching violet in the more diluted spots; the maculæ pale brown and well bordered with black, especially on the radical side."

No. 9. ARGYNNIS ZERENE, Boisduval.

"Under side of secondaries of a cinnamon color, from the middle fascia to the margin pale ferruginous; the maculæ pale yellowish; the marginal spots triangular."

"The diagnosis that Dr. Boisduval gives of *Zerene* certainly comprises two species," one of which is No. 8, *Monticola*, Behr.

"All these species, related as they are amongst themselves and to exotic species, are undeniably distinct. They inhabit different localities; they vary as little as the European *Aglaja*, and in a long series of specimens I find them constant to their respective diagnosis and without anything that should look intermediate or like transition."

"The only representative of the Arctic form of Argynnis as now known in California is *A. Epithore* Boisduval," described in Proc. Ent. Soc. Phila. March, 1864.

STATED MEETING, December 12.

President Bland in the Chair.

The Annual Report of the Recording Secretary was read, as follows:—

REPORT OF THE RECORDING SECRETARY FOR THE YEAR 1864.

Again we have assembled together to review the labors of the Society during the past year, and in presenting this, the Fourth Annual Report, the Recording Secretary takes pleasure in stating that naught but success has attended the efforts put forth to advance the science of Entomology. Although the labors are participated in but by a small portion of the members, yet much has been accomplished, and much valuable information has been given to the scientific world. The Society has succeeded in carving out for itself a name amongst the Scientific Institutions of the world, that will not soon be blotted out.

The Reports of the Committees in charge of the several departments, which will be submitted this evening for your inspection, will go far to substantiate the truth of what has been stated.

The Cabinet has received large and valuable additions thereto, particularly the orders, *Coleoptera*, *Hymenoptera* and *Hemiptera*.* Among the contributions, I would particularize the valuable collections of Cuban *Coleoptera*, *Hymenoptera* and *Hemiptera*, formerly belonging to Prof. Felipe Poey of Havana, Cuba, which said collections were purchased by our much esteemed fellow member Dr. Thos. B. Wilson,

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*The following extracts made from the Reports of the Committees in charge of the various departments, will exhibit the condition of the Cabinet at the present time:—

Coleoptera	now in	the Collection,	5,737 species.	Increase	1,829 species.
Lepidoptera	"	"	4,134 "	"	280 "
Hymenoptera	"	"	877 "	"	463 "
Diptera	"	"	431 "	"	96 "
Neuroptera	"	"	144 "	"	23 "
Orthoptera	"	"	67 "	"	16 "
Hemiptera, *Aptera*	"	"	635 "	"	293 "

Making a total of 12,025 species, being an increase of 3,000 species during the past year.

who has all along aided us in a manner that should call forth our warmest feelings of admiration and thankfulness.

The Library has not been neglected during the year just closed. Many rare and valuable works have been added thereto,* for which we are principally indebted to Dr. T. B. Wilson, Prof. J. O. Westwood of England, Prof. S. S. Haldeman of Columbia, Pa., and J. Carson Brevoort of Brooklyn, N. Y. It may be considered a pretty complete Library of reference on the subject of Entomology, and hopes are entertained that more of the members will embrace the opportunity thus afforded.

The Society's printed "Proceedings" speaks for itself. The pages more fully show the amount of labor performed. As a periodical publication it will compare favorably with the productions of kindred associations; and to those conducting this portion of the Society's labors, there cannot be bestowed too much praise and encouragement.

During the past year there have been presented for publication 42 Papers, as follows:—

9. By *Aug. R. Grote*, to wit:

"Descriptions of North American Lepidoptera." 4 Papers.

"Description of a new species of North American Gortyna."

"Description of a new species of North American Papilio."

"Descriptions of a new genus and species of North American Noctuina."

"List of a collection of Lepidoptera Heterocera, taken near Williamstown, Mass."

"Notes on certain species of North American Lepidoptera."

7. By *E. T. Cresson*, to wit:

"On the North American species of several genera of Apidæ."

"On the North American species of the genus Osmia."

"Descriptions of North American Hymenoptera, in the collection of the Entomological Society of Philadelphia."

"Descriptions of several new species of Apidæ."

"Descriptions of two new genera of North American Ichneumonidæ."

"On the Hymenoptera of Cuba."

"Descriptions of two new species of Masaris."

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* There is now in the Library 1,083 volumes and pamphlets, being an increase of 193 during the past year.

5. By *Benj. D. Walsh, M. A.*, to wit:

"On Dimorphism in the Hymenopterous genus Cynips, with an Appendix, describing a few new Cynipideous species that inhabit the Oak galls of Illinois."

"On the Pupæ of the Ephemerinious genus Bætisca."

"On certain Entomological speculations of the New England School of Naturalists."

"On Phytophagic varieties and Phytophagic species."

"On the Insects Dipterous, Coleopterous and Lepidopterous, inhabiting the galls of certain species of Willow."

4. By *Wm. H. Edwards*, to wit:

"Descriptions of certain species of Diurnal Lepidoptera, found within the limits of the United States and British America."

"Descriptions of certain new species of Catocala, found within the United States."

"Description of the female of Argynnis Diana."

"Notes on the Argynnides of California."

3. By *Tryon Reakirt*, to wit:

"Contributions towards a monograph of the genus Crocota."

"Descriptions of three new species of Limacodes."

"Notes upon Exotic Lepidoptera, chiefly from the Philippine Islands, with descriptions of some new species."

2. By *Jas. H. B. Bland*, to wit:

"Descriptions of several new species of North American Coleoptera." 2 Papers.

2. By *Brackenridge Clemens, M. D.*, to wit:

"North American Micro-Lepidoptera." 2 Papers.

2. By *J. A. Lintner*, to wit:

"Notes on some of the Diurnal Lepidoptera of the State of New York, with descriptions of their larvæ and chrysalides."

"Notes on some Sphingidæ, with descriptions of their larvæ and pupæ."

2. By *A. S. Packard, Jr.*, to wit:

"Synopsis of the Bombycidæ of the United States." 2 Papers.

1. By *J. W. Weidemeyer*, to wit:

"Catalogue of the North American Butterflies." (Conclusion.)

1. By *P. R. Uhler*, to wit:

"Orthopterological contributions."

1. By *Edward Norton*, to wit:

"Notes on the Tenthredinidæ, with descriptions of new species, in the collection of the Entomological Society of Philadelphia."

1. By *Baron R. Osten Sacken*, to wit:

"Description of several new North American Ctenophoræ."

1. By *John Kirkpatrick*, to wit:

"List of Diurnal Lepidoptera, found in the vicinity of Cleveland, Ohio."

1. By *H. F. Bassett*, to wit:

"Descriptions of several new species of Cynips, and a new species of Diastrophus."

During the past year ending November 30th, 1864, there have been elected 3 Resident and 10 Corresponding Members. The Society now numbers 71 Resident and 84 Corresponding Members.

The department of *Insect Architecture* is as yet in its infancy. The additions made thereto have not been as large as was expected; but there is no doubt that when once the utility of said department has been impressed upon the minds of the members, they will be stimulated to render increased aid thereto, and make it as efficient as the other departments.

Before closing my Report, I would again refer to the valuable aid rendered by Dr. Wilson, through whose liberality several large cases have been added to the Cabinet, thereby meeting the wants of the various Committees, enabling them to arrange the specimens on the most approved plans.

All of which is respectfully submitted.

J. FRANK KNIGHT,
Recording Secretary.

The Annual Reports of the Corresponding Secretary, Treasurer, and Standing Committees on Coleoptera, Lepidoptera, Hymenoptera, Diptera, Neuroptera and Orthoptera, Hemiptera and Aptera, Library, Publication, Collecting Fund, and Insect Architecture, were read.

The following communication was read from Mr. Tryon Reakirt:—

"In the Proceedings of the Society, for September, I described three new species, temporarily placed in the genus *Limacodes:* two of these, *L. viridus* and *L. Lorquini*, belong to the genus PARASA, Moore, *Neæra*, Herrich-Schäffer, being preöccupied by a genus of Diptera): also, upon further examination, I find that the ♂ and ♀ of *P. Lorquini*, are in reality two distinct species, both ♀.

To the supposed male of that species, I will now give the name of *P. zulona:* we then have

Parasa Lorquini, Reakirt.
Parasa zulona, nov. sp.
L. Lorquini ♂. Reakirt, Proc. Ent. Soc. III. p. 250. (Sept. 1864).
Parasa viride, Reakirt, (olim *viridus*).

in place of the two former species.

Species No. 3, of my former paper, *L. minuta* may very properly be separated from that genus, and erected into a new one, *Kronæa*, having the following generic characters.

KRONÆA, nov. gen.

Body, slender; proboscis not visible; palpi, porrect, slender, extending a little beyond the head; first joint, short; third, elongate, acute; antennæ, simple in both sexes, double the length of the thorax; abdomen, extending slightly beyond the hind wings; legs, very slender, naked; hind tibiæ, furnished with three rather long spurs.

Fore wings, sub-triangular; costal margin nearly straight; slightly rounded at the apex; interior angle, sharp; outer margin not quite so long as the inner; second inferior vein a little further from the third than the first; third a little further from the fourth than from the second. Hind wings, obovate.

Kronæa minuta, Reakirt.
L. minuta, Reakirt, Proc. Ent. Soc. III. p. 251. (Sept. 1864.)"

The following Papers were presented for publication in the Proceedings;—

"Descriptions of certain species of Diurnal Lepidoptera, found within the limits of the United States and British America, No. 4, by Wm. H. Edwards."

"Notes upon the variation of sexes in Argynnis Diana, by H. W. Bates, of London, England."

The Society then proceeded to elect Officers and Standing Committees for the ensuing year, with the following result:—

OFFICERS.

PRESIDENT.

James H. B. Bland.

VICE-PRESIDENT.

William S. Pine.

CORRESPONDING SECRETARY.

E. T. Cresson.

RECORDING SECRETARY.

J. Frank Knight.

TREASURER.

James W. McAllister.

STANDING COMMITTEES.

COLEOPTERA.

J. H. B. Bland, Samuel Lewis, M. D., Charles Wilt.

LEPIDOPTERA.

James Ridings, Charles A. Blake, Aug. R. Grote.

HYMENOPTERA.

E. T. Cresson, George Newman, J. W. McAllister.

DIPTERA.

T. B. Wilson, M. D., Charles Wilt, Daniel Wiest.

NEUROPTERA AND ORTHOPTERA.

John Meichel, James Ridings, Chas. F. Parker.

HEMIPTERA AND APTERA.

James H. Ridings, William S. Pine, J. Frank Knight.

LIBRARY.

Charles A. Blake, Samuel Lewis, M. D., J. W. McAllister.

PUBLICATION.

T. B. Wilson, M. D. E. T. Cresson, John Meichel.

COLLECTING FUND.

Samuel Lewis, M. D., Charles Wilt, E. T. Cresson.

INSECT ARCHITECTURE.

J. Frank Knight, James H. Ridings, Charles A. Blake.

Notes upon EXOTIC LEPIDOPTERA, chiefly from the Philippine Islands, with descriptions of some new species.

BY TRYON REAKIRT.

I have not confined myself to descriptions of Lepidoptera from the locality above indicated alone; but where other species have been required from other places to complete a natural group, when I have had them in my collection, I have introduced them for the purpose of showing the shades of resemblance and the transition from one species to another through different degrees of latitude. Climatal influence often exercises great power in the variation of species; some are changed so as to be scarcely recognizable, bearing no similitude to their normal condition.

Besides, those associated by nature in their form and habits, I have also, in addition to a number of new species, described all the remaining Asiatic, including the surrounding islands, African and Australian Lepidoptera in my collection, for this reason:

Few descriptions of exotic Lepidoptera are to be found in the English language, and where there are such, they are scattered through a multitude of proceedings of different societies, none of which are American; or are to be found in some larger and more collective work, which, most probably, is inaccessible to a majority of Entomological students.

Dr. Boisduval has attempted to fill the void created by the want of a descriptive work with his Spécies Général, but this, besides being imperfect in many respects, is also, unfortunately, not in our language. On account of the great need of such a work I have attempted the description of a small portion of the Eastern Lepidoptera, giving as full synonymy as possible, contrasting my specimens with author's descriptions, and remarking their differences and peculiarities.

In order to give a complete list of authentic localities in which the species described have been found, I have combined those mentioned in the Catalogue of the British Museum, and in the collections of the East India Company and Dr. Boisduval, together with mine, which furnishes many new geographical locations for well known species.

Localities mentioned by authors, but of which the species are included in none of the above, I have presented in the form of a quotation, with the authority appended.

I must also state, that for a great deal of valuable information respecting the habits of the butterfly in its various stages, and also for a great part of the larval descriptions introduced, I am indebted to the notes and illustrations of these, which are contained in the Lepidopterous Catalogue of the Museum of the East India Company, compiled by Messrs. Horsfield and Moore. Other sources of knowledge I have appropriately credited in their proper place.

It has been my object, as far as possible, to collect all reliable information upon the described species, forming of each a perfect diagnosis, so far as scanty sources of information would permit me. For the first periods of their ephemeral existence I have been obliged to rely exclusively upon the statements of others, whilst I can but regret that my collection is not so full as to enable me to fulfill at least the latter part of the plan I had laid out, and I can only hope that the constant addition of new specimens will permit me in time to finish it more thoroughly.

ORNITHOPTERA, Boisd.

1. **Orn. Rhadamanthus**, Boisd.

Orn. Rhad. Lucas, Pap. Exot. p. 5, (Orn. Amphrisius ♂) t. 2. f. 1. (1835).
Boisd., Sp. Gén. I. p. 180. n. 8. (1836).
E. Doubled., Cat. Brit. Mus. p. 2. (1844).
Diurnal Lepidopt., I. p. 4. n. 10. (1846).
Cat. Lep. Mus. E. I. Co. I. p. 88. n. 178. (1857).
Pap. (*Orn.*) *Rhad.* G. R. Gray, Cat. Lep. Br. Mus. pl. I. p. 6. n. 14. (1852).
" List. Lep. Brit. Mus. Pt. 1. p. 5. (1856).
*Pap. Astenous** Eschsch. Voy. Kotzebue. t. 4. f. A. B. C. (1830).

"*Male.*—Superior wings, resembling those of *Heliacon*,† black, with the nervules more or less bordered with obscure white or gray rays. Inferior wings, very triangular, golden yellow, the nervules and a serrated marginal band, deep black; this last is preceded towards the anal angle by blackish atoms; emarginations entirely black.

"Below, the fore wings are the same as above; the hind wings without the blackish atoms. Head and thorax black, a red collar on the prothorax near the head; abdomen black above and yellow beneath; the breast marked with large red spots at the base of each wing.

"*Female.*—Of greater size, the inferior wings being much larger.

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* *Pap. Astenous* is Fab. sp., a synonyme of *Orn. Pompeus* Cram.

† *Orn. Heliacon,* Boisd. is *Orn. Pompeus,* Cram.

with the emarginations white; preceding the border a row of oval spots, resembling those of the female of *Heliacon*, separated or united by the black serrations of the marginal band, and which sometimes are small, in others much larger; the superior wings are striated with white rays as in the male.

"Var. *a*. *Female* has the outer border confluent with the spots, so that the inferior wings are black, with a large golden-yellow palmated spot, as in *Helena*.

"Cochin China, Manilla. (Coll. Boisd.)

"This species is distinguishable from *Heliacon* by the absence of white emarginations in the male, by the narrowness of those of the female, by the size of the red spots on the lower part of the thorax, but above all, by the very triangular form of the hind wings of the male." *Boisd.*

Antennæ and legs black. Dr. Boisduval omits mentioning that the black atoms on the inferior wings terminate anteriorly in a point, that the discal cell is also covered with fine long black hairs, that the anal margin is very broad and black, and that the anal valves are yellowish white; expanse 5.13 inches.

My *female* agrees with Var. *a*. Boisd. with the addition of three white discal rays and white emarginations on the fore wings; a black tooth, extending from the black macular sub-marginal band up the sub-median interspace of the hind wings; and a sub-marginal row of six yellow spots, very small on the upper surface, much enlarged below, the first three being triangular, and the last three oblong, divided by the nervules; these spots are mentioned in Lucas' description; the palmated spot, just before the black anal margin, becomes pale drab: expanse 6½ inches.

Lucas says in his description, that the black border of the male is covered with a fine yellow down, of which I can see nothing in my specimens. He figures this species under the erroneous name of *Amphrisius* ♂; it is rather less than my ♂, expanding only 4.75 inches; it it should not have been colored orange near the black marginal band of the hind wings, and the outer angle of the secondaries is too much rounded; otherwise the figure is correct.

Hab.—Philippines, (In my collection.)
India, (Coll. E. I. Co.)
Nepaul, Moulmein, Hong-Kong, (Coll. Brit. Mus.)

An extract from Capt. Mortimer Slater's "Notes" (p. 390) in the Appendix to Cat. Lep. Mus. E. I. Co. I. p. 2, says: "this species was common at Dacca, 1845, and at Darjeeling, being partial to the feathery scarlet flowered plant about which they hover, and may be easily caught by the hand, as its flight is heavy."

ATROPHANEURA, nov. gen.

HEAD, large.

Eyes, oval, prominent.

Antennæ, long, with the club, elongate, annulated.

Labial palpi; first and second joints, short; third, long; hairy, particularly the last joint.

THORAX robust, clothed with long hairs, nearly equalling *Ornithoptera* in size. Prothorax developed more than in *Papilio.*

ABDOMEN, large, very long, extending to the anal angle of the posterior wings, and furnished, in the male, with a pair of very large anal valves.

ANTERIOR WINGS, sub-triangular, elongate, rounded at the apex; inner margin not more than half the length of the costal; costal and median nervures very prominent; upper disco-cellular nervule less than the space between the two discoidal nervules; third sub-costal nervule thrown off at the end of the cell; median and sub-median nervures are united by an interno-median.

POSTERIOR WINGS, sub-ovate, deeply dentate, prolonged in the male in a small tail; pre-costal nervure, bi-branched, the inner division bent downwards and united to the costal nervure; lower disco-cellular nervule atrophied, the discal nervule in conjunction with the first median nervules at the extremity of the cell, and appearing as a third sub-costal nervule; discoidal cellule, very much elongated, the median nervure, which is very stout, forking near its lower extremity; the third nervule at ¾ths of its length, the second is separated from the first by an interval of little more than half a line; a deep channel on the anal margin for the reception of the abdomen; sub-median interspace very large, thrown over into a fold on the upper surface.

LEGS, long and powerful; anterior tibiæ with a long spine; tarsi, first joint, equal in length to the rest combined, the fourth joint, the shortest; claws, all simple.

2. **Atroph. erythrosoma,** nov. sp.

Male.—Antennæ, black; head, red; palpi, first article black, second and third bright red; thorax black above, with a broad red dorsal band, and blood red beneath; abdomen bright red, two lateral black spots on the second and third segments; a row of transverse black dashes below, commencing at the base and extending to the anal valves, which are reddish brown; length of body, 1.93 inches; legs, black.

Wings. Upper surface black, covered with a purplish-blue reflection; the secondaries below the median nervure suddenly become light drab, and are produced in a tooth, a little longer than that of *Pap. Emalthion.*

Below, primaries as above; secondaries black, a series of six red spots along the outer margin, somewhat resembling those of *Emalthion*, three near the anal angle, crescent shaped externally, enclosing between themselves and the margin three black spots, the two inner red spots are prolonged interiorly, and contain two black lunules, the inner one being incomplete; above these, and near the margin three detached spots of the same color, decreasing in size as they approach the outer angle; the lowest of these last three, has a small spot above it, near the end of its interspace. Expanse 5.88 inches.

Hab.—Philippines. (In my collection.)

Pap. Varuna is allied more closely to this unique species than any other member of the genus Papilio, but even from this its nervular system is so very distinct, that no one could hesitate on this ground alone to separate it from Papilio. Another cause for separation would be the large thorax, length of abdomen, and the large anal valves, which seem to connect it with Ornithoptera, but here again, its neuration differs so that it cannot be assigned to that genus.

Possessing thus a portion of the generic characters of each, its proper position is manifestly between them.

I am indebted, not only for this fine species, but for all mentioned as from the locality of the Philippines, to my friend, Mr. E. F. Lorquin, Jr., of San Francisco, Cal. At least half of my Eastern Lepidoptera are from these Islands, although many species are likewise common to China and the Indies.

PAPILIO Linn.

3. **Pap. Emalthien,** Hübn.

♂ *Iliades Emalth.* Hübn., Samml. Exot. Schmett. II. t. 117. (1806).

Pap. Emalth. Boisd., Sp. Gén. I. p. 196. n. 7. (1836).
De Haan., Verh. Naturl. Gesch. p. 24. (1839).
Diurnal Lepidopt. I. p. 10. n. 31. (1846).
G. R. Gray, Cat. Lep. Br. Mus. Pt. 1, p. 14. n. 48, ♀ Pl. 5. f. 4. (1852).
G. R. Gray. List. Lep. Br. Mus. pt. I. p. 17. (1856).
Pap. Floridor. ♂. Godt. Encyc. Sup. p. 809. n. 10—12. (1819).
Pap. Krusensternia. Eschsch. Voy. Kotzebue. t. 3. f. 5. (1830).

"Size of Memnon.

"*Male.*—Wings black; the superiors having long grayish rays at the extremities; the inferiors marked on their posterior half by large whitish-gray spots, separated by the nervules; the anal angle marked with a red spot, surmounted by a group of grayish-blue atoms. Below, the primaries resemble the upper surface, with a triangular blood red spot at the base; the secondaries have four red spots at the base, separated by the nervures, and along the outer margin a row of annulated spots of the same color, of which the outermost are incomplete, and the two inner ones elongated; the second of these last being the largest, and containing two black oval spots.

"*Female.*—Wings blackish; primaries striated on their middle with long whitish rays, and the base covered by a large triangular blood red spot, powdered with white atoms.

"Secondaries of a brown-black, having three red-ringed spots on the outer margin, proceeding from the anal angle, of which the middle one is carried up to the base through the lower median interspace; in passing through the discoidal cellule it is cut by a bifid white nervure. Below, the primaries are as above. The secondaries the same as in the male, that is, with the three outermost rings open, whilst the fifth spot extends towards the base, as on the upper surface; whereas in the male this is most commonly interrupted.

"Manilla, (Coll. Boisd.)"—*Boisd.*

My specimens differ somewhat from the above description.

Male.—Body brownish, pale underneath; femora have white hairs on the side; the anal spot is a lunule. Below it has five spots at the base of the secondaries, the last extending some distance along the anal margin; there are seven spots on the outer margin, pupilled with black, the four outermost being imperfect; on the first and seventh, above the black center, and on the sixth, between the two black pupils, small groups of pink white atoms. Emarginations of the hind wings whitish, a projecting tooth in the lower half of the outer margin; expanse 5.13 inches.

Female.—On the secondaries four marginal annulose spots; the prolongation of the second becomes pink and white above the first black spot, as far as the median nervure, above that, it again turns to bright red; some bluish atoms near the outer margin.

Below, the marginal red basal spot is not near so long as in the male, and the extension of the second marginal ring is continued only to the discoidal cellule. Body brown; expanse 5.22 inches.

Hübner gives a good figure of the male, but the divergent striæ on the posterior wings are more greenish than he represents.

Gray's figure of the ♀ gives for its expanse 6 inches. It also differs from my specimen. He gives the body a row of lateral ochreous spots, of which I can see nothing in my specimen; not near so much red on the upper surface, that at the base being mixed with white; only three marginal annulations, the third being very indistinct. The pink band, from the margin to the base, almost obsolete, and represented by but two whitish lines.

Below, the only perceptible difference is in the size of the basal spots, and the length of the sixth marginal spot, which, in mine, extends to the discal cell, whilst that of the Brit. Mus. does not proceed so far.

Eggs, extracted from the body of the female, round, white.

Hab.—Philippines, (In my collection.)
Manilla, (Coll. Brit. Mus.)

4. **Pap. Memnon,** Linné.

♂ *Pap. Memnon.* Linn., Syst. Nat. II. p. 747. n. 13. (1767).
Cram., I. t. 91. f. c. (1775).
Herbst, Pap. I. t. 6. f. 2, 3. (1783).
Fab. Ent. Syst. III. i. p. 12. n. 36. (1793).
Godt. Encyc. IX. p. 29. n. 10. (1819).
Esper, Ausl. Schmett. t. 20. f. 3. (1801).
Swainson, Zool. Ill. 2nd ser. t. 95. (1832).
Boisd., Spéc. Gén. I. p. 192. n. 6. (1836).
De Haan. Verh. Naturl. Gesch. p. 23. t. 3. f. 1. (1839).
E. Doubled., Cat. Brit. Mus. pt. 1. p. 2. (1844).
Diurnal Lepidopt., I. p. 10. n. 30. (1846).
G. R. Gray, Cat. Lep. Brit. Mus. pt. 1 p. 13. n. 47. (1852).
Nat. Library, XXXI. Duncan, p. 97. (1852).
G. R. Gray. List. Lep. Brit. Mus. pt. I. p. 14. (1856).
Cat. Lep. Mus. E. I. Co. I. p. 99. n. 202. (1857).

Iliades Memnon Hübn., Vers. bek. Schmett. p. 89. (1816).
Pap. Arbates. Zinken Sommer, Nova Acta Acad. Nat. Cur. XV. p. 151. (1831).

Male.—Wings black; upper surface with a greenish reflection; anterior wings with long grayish striæ, the posterior wings with greenish; the upper wings have a triangular red or ochreous spot at the base on the under side, and there are likewise five small red marks on the same part of the inferior wings; the latter are deep black anteriorly and dark cinereous behind; the cinereous portions containing two rows of deep black rounded spots, that next the angle encircled with yellow. Under surface of fore wings marked with whitish-gray rays. Body black. dusted sparsely with blue and golden green atoms. Expanse 5.25 inches.

Hab.—Java, (Coll. Brit. Mus. and E. I. Co.)
Philippines, (In my collection.)

Var. *a.* ♂. *Pap. Androgeos.* Cram. I. t. 91. f. A. B. (1775).
Boisd., Sp. Gén. I. p. 193. n. 6. (1836).
E. Doubled., Cat. Brit. Mus. pt. 1. p. 2. (1844).
Diurnal Lepidopt., I. p. 10. n. 30. (1846).
G. R. Gray, *Pap. Memnon*, var. *a.* Cat. Lep. Brit. Mus. Pt. I. p. 13. n. 47. (1852).
Nat. Library, XXXI. Duncan, p. 98. (1852).
G. R. Gray, List. Lep. Brit. Mus. p. I. p. 14. (1856).
Cat. Lep. Mus. E. I. Co., var. *a.* p. 99. n. 202. (1857).
Pap. Memnon. Esper, Ausl. Schmett. t. 8. f. 1. (1801).
Iliades Mestor. Hübn., Vers. bek. Schmett. p. 89. (1816).

"This variety of the ordinary male differs from it, in having the black spots of the first row on the posterior wings, preceded by bluish lunules, and the two inner spots of each row, surrounded by reddish violet."—*Boisd.*

In my specimens, the reddish violet extends to three spots on the marginal row, and only partly covers those of the internal. Expanse 5.75 inches.

Hab.—Philippines, China, (In my collection.)
China, (Coll. Boisd.)
Pinang and Darjeeling, (Coll. E. I Co.)
Borneo, Northern India, China, (Coll. Brit. Mus.)

The variations of the female are much more numerous than those of the male, and more interesting, inasmuch as they have changed so greatly as to scarcely retain a vestige of their normal condition; not only in color, but in outline also do they differ.

Dr. Boisduval says, "that very rarely, there are some found in Java which resemble the male. If it were not for this rarity, we should be apt to consider them as the normal type."

Var. *a.* ♀. *Pap. Anceus.* Cram. III. t. 222. f. A. B. (1780).
Boisd., Sp. Gén. I. p. 193. n. 6. (1836).
E. Doubled., Cat. Brit. Mus. Pt. p. 2. (1844).
Diurnal Lepidopt., I. p. 10. n. 30. (1846).
G. R. Gray, *P. Mem.* var. *b.* Cat. Lep. Br. Mus. Pt. I. p. 13. n. 47. (1852).
Nat. Library, XXXI. Duncan, p. 98. (1852).
G. R. Gray, List. Lep. Brit. Mus. Pt. I. p. 14. (1856).
Cat. Lep. Mus. E. I. Co. var. B. I. p. 100. n. 202. (1857).
Iliades Ancæus Hübn., Verz. bek. Schmett. p. 88. (1816).

"Similar to the male, but with an orange body, and a triangular white spot on the upper surface, at the base of the fore wings; the anal angle ochreous on both sides."—*Boisd.*

Hab.—Sumatra, (Coll, Boisd. and Brit. Mus.)

Var. *β.* ♀. *Pap. Laomedon.* Cram., I. t. 50, f. A. B. (1775).
Boisd., Sp. Gén. I. p. 193. n. 6. (1836).
Diurnal Lepidopt., I. p. 10. n. 30. (1846).
G. R. Gray, *P. Memnon,* var. *c.* Cat. Lep. Br. Mus. Pt. 1. p. 13. n. 47. (1852).
Nat. Library, XXXI. Duncan, p. 98. (1852).
List. Lep. Brit. Mus. Pt. I. p. 14. (1856).
Cat. Lep. Mus. E. I. Co. var. c. p. 100. n. 202. (1857).
Pap. Memnon (pt.) Fab. Ent. Syst. III. i. p. 12. n. 36. (1793).
Iliades Laomedon Hübn., Verz. bek. Schmett. p. 89. (1816).

"Has a triangular red spot at the base of the superior wings, and the black spots of the second row, on the margin of the hind wings below, are more or less encircled by ochreous."—*Boisd.*

Hab.—Java, Northern India, (Coll. Brit. Mus.)
Java, (Coll. E. I. Co.)

♀. *Pap. Laomedon.* var. A.
G. R. Gray, *Pap. Memnon,* var. *d.* Cat. Lep. Brit. Mus. Pt. I. p. 13. n. 47. (1852).
Cat. Lep. Mus. E. I. Co. var. D. I. p. 100. n. 202. (1857).

"Like *P. Laomedon* in form and general appearance, but the primary wings are marked on the inner margin by a space of white. The secondary wings black, speckled between the nervules with pale blue scales."—*G. R. Gray.*

Hab.—Northern India, (Coll. Brit. Mus.)
Cherra Poonjee, (Coll. E. I. Co.)

♀. *Pap. Laomedon.* var. B.
De Haan, Verh. Nat. Gesch. p. 24. t. 3. f. 2. (1839).
G. R. Gray, *P. Memnon,* var. *e.* Cat. Lep. Brit. Mus. Pt. I. p. 13. n. 47. (1852).
Cat. Lep. Mus. E. I. Co. var. E. I. p. 100. n. 202. (1857).

Hab.—"Eastern Archipelago, (Padang)"—*De Haan.*

♀. *Pap. Laomedon.* var. C.
G. R. Gray, Cat. Lep. Brit. Mus. Pt. I. *P. Memnon* var. *f.* p. 13. n. 47. (1852).
Cat. Lep. Mus. E. I. Co. var. F. I. p. 100. n. 202. (1857).

"Like the former, but without the buff space at the anal angle of the secondary wing, while beneath, at the same part, there is a large space of yellowish red, spotted with black."—*G. R. Gray.*

Hab.—Penang, (Coll. Brit. Mus.)

Var. *γ.* ♀. *Pap. Agenor.* Clerck. Icon. t. 15. (1759).
Linn. Syst. Nat. II. p. 747. n. 14. (1767).
Cram. I. t. 32. f. A. B. (1775).
Herbst, Pap. t. 8. f. 3. (1784).
Fab. Ent. Syst. III. i. p. 13. n. 39. (1793).
Esper, Ausl. Schmett. t. 26. f. 1. (1801).
Donovan, Ins. of China, pl. 24. f. 2. (1805).
Godt. Encyc. IX. p. 28. n. 9. (1819).
Boisd., Sp. Gén. I. p. 194. n. 6. (1836).
E. Doubled., Cat. Brit. Mus. Pt. 1. p. 2. (1844).
Diurnal Lepidopt., I. p. 10. n. 30. (1846).
G. R. Gray, *P. Memnon.* var. *g.* Cat. Lep. Brit. Mus. Pt. I. p. 13. n. 47. (1852).
Nat. Library, XXXI. Duncan, p. 97. t. 2. f. 1. (1852).
G. R. Gray, List. Lep. Br. Mus. Pt. I. p. 14. (1856).
Cat. Lep. Mus. E. I. Co. I. p. 100. n. 202. (1857).
Iliades Agenor. Hübn., Verz. bek. Schmett. p. 89. (1816).

"Upper wings blackish, marked with numerous longitudinal rays of a grayish-ash color, each of the wings having a large blood-red or ochrey-yellow triangular patch at the base. The inferior wings are waved on the hinder margin, and narrowly edged with white in the emarginations, the disk almost entirely occupied by a broad white band divided by the dark nervures, the hinder portion dusky with a series of deep-black spots of an ovate or rounded form; that, placed on the anal angle. smaller than the rest and encircled with fulvous, which color extends to the extremity of the internal border; on the under side, as above, and spotted with red or ochre-yellow at the base; body black, the prothorax marked with several white points."—*Duncan.*

In my specimen the discal white band is surmounted by scattered bluish-green atoms. Expanse 6.13 inches.

Hab.—Philippines, (In my collection.)
Northern India, (Coll. Brit. Mus.)
Java, (Coll. E. I. Co.)

Var. ♂. ♀. *Pap. Achates.* Cram., II. 182. f. A. B. t. 243. f. A. (1777).
Herbst, Pap. t. 15. f. 1. (1784).
Fab. Ent. Syst. III. i. p. 9. n. 24. (1793).
Esper. Ausl. Schmett. t. 28. f. 1. (1801).
Godt. Encyc. IX. p. 64. n. 107. (1819).
Boisd. Sp. Gén. I. p. 194. n. 6. (1836).
E. Doubled., Cat. Brit. Mus. (1844).
Diurnal Lepidopt., I. p. 10. n. 30. (1846).
G. R. Gray, *P. Memnon*, var. *i.* Cat. Lep. Brit. Mus. Pt. 1. p. 14. n. 47((1852).
G. R. Gray, List. Lep. Brit. Mus. Pt. 1. p. 14. (1856).
Cat. Lep. Mus. E. I. Co. var. I. I. p. 100. n. 202. (1857).
Pap. Achatiades. Esper, Ausl. Schmett. t. 28. f. 3, t. 29. f. 1. (1801).
Achillides Achates. Hübn., Verz. bek. Schmett. p. 85. (1816).

"Inferior wings, ending in a large black tail. Fore wings resembling those of *Agenor*, with the basal spot sometimes red, sometimes fulvous. Hind wings black; disc white, divided by black nervules into eight unequal spots; emarginations of a grayish-white, except the two outermost and that on the anal angle, which are ochry-yellow or brownish-red. Below, as above, with three little yellow or red marks at the base of the hind wings. Body black, with a broad lateral yellow band on the abdomen, and several white spots on the prothorax."—*Boisd.*

Hab.—Northern India, (Coll. Brit. Mus.)
Java, (Coll. E. I. Soc.)

♀ *Pap. Achates.* var. A.
De Haan, Verh. Natural Gesch. p. 24. t. 3, f. 3. (1839).
G. R. Gray, *P. Memnon*, var. *h.* Cat. Lep. Brit. Mus. Pt. 1. p. 13. n. 47. (1852).
Cat. Lep. Mus. E. I. Co. var. H. I. p. 100. n. 202. (1857).

Hab.—" Eastern Archipelago."—*De Haan.*

♀ *Pap. Achates.* var. B.
G. R. Gray, *P. Memnon*, var. *j.* Cat. Lep. Brit. Mus. Pt. 1. p. 14. n. 47. (1852).
G. R. Gray, List. Lep. Brit. Mus. Pt. 1. p. 14. (1856).

" Like *P. Achates* in form and general appearance, but without the red triangular spot at the base of the primaries. The secondary wings are marked in the place of the red, as in *P. Achates*, with ochraceous."—*G. R. Gray.*

Hab.—Java, (Coll. Brit. Mus.)

Var. *ι.* ♀ *Pap. Alcanor.* Cram., II. t. 166. f. A. (1776).
Esper, Ausl. Schmett. t. 34, f. 2. (1801).
Boisd., Sp. Gén. I. p. 194. n. 6. (1836).
E. Doubled., Cat. Brit. Mus. (1844).
Diurnal Lepidopt., I. p. 10. n. 30. (1846).
G. R. Gray, *P. Memnon*, var. *k.* Cat. Lep. Br. Mus. Pt. 1. p. 14. n. 47. (1852).
G. R. Gray, List. Lep. Brit. Mus. Pt. 1. p. 14. (1856).
Cat. Lep. Mus. E. I. Co., var. κ. I. p. 101. n. 202. (1857).
Pap. Alphenor. Fab. Sp. Ins. II. p. 4. n. 11. (1781).
Herbst, Pap. t. 16, f. 1. (1784).
Pap. Achates β. Fab. Ent. Syst. III. i. p. 9. n. 24. (1793).
Godt. Encyc. IX. p. 64. n. 107. (1819).
Achillides Alcanor. Hübn., Verz. bek. Schmett. p. 85. (1816).

Fore wings cinereous, striated with brown rays; costal half of basal patch, blood red, posterior portion deep black. Posterior wings tailed, black; a row of four sagittate spots on the disc, white anteriorly, changing to pink in their hind part; a small pink spot at the extremity of the cell, and another above the first discal mark. Emarginations wide, fulvous; the two outer edged with white; the two inner very large, and reddish-brown. A large reddish-brown anal spot containing a large black pupil.

Below, the fore wings become whitish-gray with black rays. Hind wings deep black, four ferruginous spots at the base; the transverse macular band becomes pure white, the extremities of the third and fourth spots produced, until they unite with the two large inner marginal lunules. Expanse 6.38 inches.

Body black, with a broad yellow band on the sides of the abdomen; prothorax marked with white.

Hab.—China, (In my collection.)
Cherra Poonjee, (Coll. E. I. Co.)
Northern India, (Coll. Brit, Mus.)

Swainson, Zool. Ill. 2nd series t. 95. (1832).
Larva. Boisd., Sp. Gén. I. p. 195. n. 6. t. 1. f. 2. (1836).
Pupa. Nat. Library, XXXI. Duncan, p. 98. (1852).
Cat. Lep. Mus. E. I. Co., t. 11. f. 1. 1a. (1857).

The anterior part of the body is considerably attenuated, somewhat resembling the larva of the genus *Darapsa*, the first segments a little retractile. Green, with a white ocelliform lateral mark, black pupilled, on the third segment, and a transverse white band; a band of pale green between the fourth and fifth segments, and an oblique whitish-green stripe on the eighth and ninth; an irregular triangle on the lower half of the tenth segment, and the anal segment of the same color. Larva feeds on different kinds of *Citrus*. Chrysalis green; whitish-green on the lower part of the abdomen; reddish-yellow on the back.

This description is taken from the figure in the Cat. Lep. Mus. E. I. Co., and illustrates the preparatory stages of a Javanese variety.

"This butterfly is very active, and difficult to catch, flying in and out of deep forest shades with great velocity, and generally high."—*Capt. Mortimer Slater's "Notes," p.* 420.

5. **Pap. Antiphus**, Fab.

Pap. Antiphus. Fab., Syst. Ent. III. i. p. 10. n. 28. (1793).
Donovan, Ins. India, t. 15, f. 2. (1800–1803).
Godt. Encyc., IX. p. 71. n. 129. (1819).
Boisd., Sp. Gén. I. p. 266. n. 89. (1836).
E. Doubled., Cat. Brit. Mus. Pt. I. p. 9. (1844).
Diurnal Lepidopt., I. p. 9. n. 21. (1846).
G. R. Gray, Cat. Lep. Brit. Mus. Pt. I. p. 11. n. 37. (1852).
G. R. Gray, List. Lep. Brit. Mus. Pt. I. p. 12. (1856).
Cat. Lep. Mus. E. I. Co., I. p. 94. n. 191. (1857).
Pap. Polygius, Godt. Encyc. IX. Sup. p. 8. n. 11. 129–130. (1823).
♀ *Pap. Antiphus*, De Haan, Verh. Nat. Gesch. p. 49. t. 8. f. 2. (1839).
♀ *Pap. Theseus*, Cram., II. t. 180. f. A. B. (1776).
Herbst, Pap. t. 14. f. 3. (1784).
Fab. Ent. Syst. III. i. p. 2. n. 4. (1793).
Esper. Ausl. Schmett. t. 36. f. 3. (1801).
Godt. Encyc. IX. p. 71. n. 127. (1819).
Boisd., Sp. Gén. I. p. 276. n. 99. (1836).
Diurnal Lepidopt. I. p. 11. n. 63. (1846).
G. R. Gray, Cat. Lep. Brit. Mus. Pt. I. p. 11. n. 37. (1852).
Cat. Lep. Mus. E. I. Co., I. p. 95. n. 191. (1857).
♀ *Menelaides Theseus* Hübn., Verz. bek. Schmett. p. 84. (1816).

Male.—Thorax black, a red collar on the prothorax, a row of red points below, at the base of each wing; abdomen red, a dorsal macular black band, the spots diminishing in size from the base, and a row of transverse black spots underneath. Antennæ and legs black.

Wings, upper surface deep black, the fore wings marked with cinereous rays, an obsolete row of six red lunules, the last of which only is visible, and a red anal point. Below, the fore wings are light brown, striated with whitish-gray; the secondaries deep black, with six marginal lunules, and a waved red line confluent with the anal spot, extending from the middle of the interior margin to the extremity of the discoidal cellule. Expanse 3.75 inches.

Female.—The same as the male with the exception of the white rays on the under side of the fore wings, which are dark brown, striate with black, and all the angles of the wings are much more rounded. Expanse 3.90 inches.

Hab.—Philippines, (In my collection.)
Java, (Coll. Brit. Mus.)

Var. α. ♂. *Pap. Kotzebuea.* Eschsch., Voy Kotzebue, t. 1. f. 2. (1830).
♂. *Pap. Antiphus.* De Haan, Verh. Nat. Gesch. p. 5. p. 40. (1839).
Diurnal Lepidoptera, I. p. 9. n. 21. (1846).
G. R. Gray, Cat. Lep. Brit. Mus. Pt. I. p. 11. n. 37. (1852).
Cat. Lep. Mus. E. I. Co., I. p. 95. n. 191. (1857).

Hab.—Java, (Coll. E. I. Co.)
"Manilla," Eschscholtz.

Var. β. ♂. *Pap. Antiphus.* G. R. Gray, Cat. Lep. Brit. Mus. Pt. I. p. 11. n. 37. (1852).
G. R. Gray, List. Lep. Brit. Mus. Pt. I. p. 12. (1856).
Cat. Lep. Mus. E. I. Co., I. p. 95. n. 191. (1857).

"With short caudal appendages, that are of equal width throughout their length."—*G. R. Gray.*

Hab.—Borneo, (Coll. Brit. Mus. and Mus. E. I. Co.)

6. **Pap. Alcinous,** Klug.
Pap. Alcinous. Klug, Neue Schmett. p. 1. t. 1. (1836).
De Haan, Verh. Nat. Gesch. p. 26. (1839).
Diurnal Lepidoptera, I. p. 9. n. 19. (1846).
G. R. Gray, Cat. Lep. Brit. Mus. Pt. I. p. 12. n. 45. (1852).
G. R. Gray, List. Lep. Brit. Mus. Pt. I. p. 14. (1856).
Cat. Lep. Mus. E. I. Co. I. p. 95. n. 193. (1857).

Hab.—"Japan."—*Siebold.*

Var. α. *Pap. Alcinous.* G. R. Gray, Cat. Lep. Brit. Mus. Pt. I. p. 12. n. 45. t. 4. f. 2. ♂. f. 3. ♀. (1852).
G. R. Gray, List. Lep. Brit. Mus. Pt. I. p. 14. (1856).
Cat. Lep. Mus. E. I. Co., I. p. 96. n. 193. (1857).

"*Male.*—The primary wings brownish-black, glossed with purple, having streaks of darker color between the nervules and in the discoidal cell. The secondary wings brownish-black, having the base glossed with purple, with four lunes along the outer margin of a red color with scattered black scales.

"The under surface of the primary wings is pale brownish-black, with streaks of darker color between the nervules and in the discoidal cell. The under surface of the secondary wings is deep brownish-black, with five rosy red lunes along the outer margin; and at the anal angle there is an abbreviated broad band of rosy red, which is paler in part. Expanse 4.60 inches.

"*Female.*—The primary wings pale hair-brown, with a purplish gloss, and the anterior and outer margins brownish-black; the discoidal cell and the spaces between the nervules are marked with black streaks.

The secondary wings pale hair-brown, with a satiny gloss at the base, while posteriorly they are black with a velvety appearance; five narrow lunes of pinkish white, with scattered black scales, run along the outer margin, those towards the anterior angle decreasing in size.

"The under surface of the primary wings is pale hair-brown, slightly tinged with purple, with the streaks as seen on the upper side. The under surface of the secondary wings is entirely black, more or less with a velvety appearance; six rosy red lunes are placed along the outer margin, and at the anal angle there is a large spot of the same color.

"This species is called 'Chentih' by the Chinese."—*G. R. Gray.*

Hab.—China, (In my collection.)
Northern China, (Coll. Brit. Mus.)
Bootan, (Coll. E. I. Co.)

Larva; I have described from fig. 6, Plate II. Cat. Lep. Mus. E. I. Co., which was copied from De Haan's published drawing.

Fawn color, deepest on the back, a transverse reddish brown band on the third segment, with a red ocellus at each extremity; a lateral black band, rising upwards between the fourth and fifth rings and uniting across the dorsum; a transverse oblique band on the eighth and ninth segments, and another between the anal and preceding ring. Below the lateral line, brown; stigmatæ pale fawn encircled with black, the first three are round, the remainder oblong.

7. **Pap. Bianor**, Cram.

Pap. Bianor. Cram., II. t. 103, f. *c.* (1776).
Fab. Ent. Syst. III. i. p. 1. n. 2. (1793).
Esper. Ausl. Schmett. t. 35, f. 2. (1801).

Boisd., Sp. Gén. I. p. 205. n. 17. (1836).
De Haan, Verh. Nat. Gesch. p. 28. t. 5. f. 1. ♂. f. 2. ♀. (1839).
E. Doubled., List. Lep. Brit. Mus. Pt. I. p. 3. (1844).
Diurnal Lepidoptera, I. p. 11. n. 45. (1846).
G. R. Gray, Cat. Lep. Br. Mus. Pt. I. p. 16. n. 64. (1852).
G. R. Gray, List. Lep. Brit. Mus. Pt. I. p. 20. (1856).
Cat. Lep. Mus. E. I. Co., I. p. 110. n. 220. (1857).
Achillides Bianor. Hübn., Verz. bek. Schmett. p. 85. (1816).
Papilio Paris ♀. Godt. Encyc. IX. p. 67. n. 116. (1819).

Wings thickly sprinkled with golden green atoms, brown, the atoms becoming blue on the anterior margin of the wings and the tail. The outer margin divided by lunules, of which the three or four interior ones are violet, and the others formed by blue atoms; the anal eye as in the similar species. Posterior nervules of the fore wings clothed with long brown hairs.

Under surface, base of anterior wings brown, outer half, whitish-gray, nervules and eight longitudinal striæ between them, brown. Posterior wings deep brown; base of both pair of wings powdered with green atoms.

Six lunules on the outer margin, reddish brown, each containing a violet arc; a large reddish-brown anal spot containing a large black pupil, having a violet ray above it. Emarginations, above, white; below, white with a little fulvous. Expanse 5½ inches.

The female does not essentially differ from the male.

Hab.—China, (In my collection.)
China, (Coll. Boisd.)
Northern India, China, (Coll. Brit. Mus.)
Northern India, (Coll. E. I. Co.)

8. **Pap. Ganessa,** E. Doubleday.
Pap. Ganessa. E. Doubled., Gray's Zool. Misc. p. 73. (1842).
" List. Lep. Brit. Mus. Pt. I. p. 4. (1844).
Diurnal Lepidopt. I. p. 11. n. 48. (1846).
G. R. Gray, Cat. Lep. Br. Mus. Pt. I. p. 16. n. 66. t. 3. f. 5. ♂. (1852).
G. R. Gray, List. Lep. Brit. Mus. Pt. I. p. 20. (1856).
Cat. Lep. Mus. E. I. Co., I. p. 108. n. 214. (1857).
Pap. Arcturus. (Westw.) Erichs. Wiegm. Archiv. für. Naturg. II. p. 248. (1843).

Male.—"Above: All the wings black, irrorated with golden green atoms; anterior wings, with the termination of the radial and of the first branches of the median nervures, clothed with a cottony down;

cilia white; posterior wings glossed anteriorly with blue; this portion irrorated with blue atoms; near the external angle is a large brilliant blue patch, slightly sinuated anteriorly, deeply so posteriorly, not connected by any sinuous line with the abdominal margin; near the margin is a series of from three to five red lunules, the one at the anal angle divided by, the others margined with, a slender light blue line; indentations margined with white; tail broad, spatulate irrorated with green along the nervure.

"Below: anterior wings black at the base, whitish beyond the discoidal cell; the nervures, eight longitudinal striæ between the nervures, and the margin itself, fuscous; posterior wings black, more intense than above, irrorated over the basal half, and sometimes beyond, with whitish atoms; near the margin is a series of six red lunules, each divided longitudinally by a slender light blue line; indentations margined with white, a little fulvous at the base; anal angle with an imperfect ocellus, of which the pupil is black, the iris red, marked with a blue crescent.

"Head, thorax and abdomen, black, irrorated with golden green. (Exp. alar. 5 unc.)"—*E. Doubleday.*

"Most probably only a variety of *Pap. Polyctor*, Boisd."—*G. R. Gray.*

Hab.—Philippines, (In my collection.)
Northern India, (Coll. Brit. Mus.)
Northern India, Darjeeling, (Coll. E. I. Co.)

Var α. **Pap. Ganessa**, E. Doubleday.
Pap. Aliacmon, Boisd. MSS.
Hub.—Northern India, (Coll. Brit. Mus.)

9. **Pap, Paris**, Linné.
Pap. Paris. Clerck Icones, t. 13. f. 1. (1759).
Linn. Syst. Nat. II. p. 745. n. 3. (1767).
Drury, I. t. 12. f. 1, 2. (1770).
Cram., II. t. 103. f. A. B. (1779).
Herbst, Pap. t. 14. f. 1, 2. (1784).
Fab. Ent, Syst. III. i. p. 1. n. 1. (1793).
Donovan, Ins. China, t. 23. (1798).
Esper. Ausl. Schmett. t. 2. f. 1. (1801).
Godt. Encyc. IX. p. 67. n. 116. (1819).
Boisduval, Sp. Gén. I. p. 208. n. 22. (1836).
E. Doubled., List. Lep. Brit. Mus. Pt. I. p. 4. (1844).
Diurnal Lepidopt. I. p. 11. n. 52. (1846).

G. R. Gray, Cat. Lep. Brit. Mus. Pt. I. p. 17. n. 66. (1852).
Nat. Library, XXXI. Duncan, p. 102. t. 3. f. 2. (1852).
G. R. Gray, List. Lep. Brit. Mus. Pt. I. p. 21. (1856).
Cat. Lep. Mus. E. I. Co. p. 107. n. 213. (1857).
Achillides Paris. Hübn., Verz. bek. Schmett. p. 85. (1816).

Upper surface, brownish black, irrorated with golden green atoms; some of these are grouped together near the extremity of the inner margin of the anterior wings, forming transverse fasciæ, sometimes obsolete.

Posterior wing, with a brilliant azure blue spot, sinuated posteriorly, near the anterior angle and connected with the abdominal margin, by two lines of condensed green atoms, the space between which is sometimes devoid of green atoms, and enclosing at the anal angle, an ocellate spot having a reddish brown iris, surmounted by a very narrow violet arc; tail black and spatulate; indentations, white, on the hind wings.

Below: brown, base of the wings irrorated with greenish-white atoms, a grayish-white transverse band, divided by the black nervures, on the apical half of the anterior wings; more or less distinct in different specimens. Posterior wing with a marginal row of seven ocelliform spots; usually, all are imperfect except the anal, though sometimes the second is also complete; these have a yellowish-red iris divided anteriorly by a slender violet arc; body black, powdered with particles, in the same manner as the wings.

Female.—Differs only in the ground color being a little darker, and in having, on the superior wings, a transverse ray of condensed particles, which reaches from the internal margin almost to the middle. Expanse 3.88—4.56 inches.

Hab.—Philippines, China, (In my collection.)
China, (Coll. Boisd.)
China, Northern India, (Coll. Brit. Mus.)
Cherra Poonjee, Darjeeling, N. India, Canara, (Coll. E. I. Co.)

The *Larva* is probably very similar to that of *Pap. Arjuna*, which will be described in its proper place.

10. **Pap. Arjuna**, Horsfield.
Pap. Arjuna. Horsfield, Cat. Lep. Mus. E. I. Co. t. 1. f. 4. (1828).
Boisd., Sp. Gén. p. 209. n. 23. (1836).
E. Doubled., List. Lep. Brit. Mus. Pt. I. p. 4. (1844).

Diurnal Lepidopt., I. p. 11. n. 53. (1846).
G. R. Gray, Cat. Lep. Brit. Mus. Pt. I. p. 17. n. 67. (1852).
G. R. Gray, List. Lep. Brit. Mus. Pt. I. p. 21. (1856).
Cat. Lep. Mus. E. I. Co. I. p. 107. n. 212. (1857).
Pap. Paris. var. Godt. Encyc. IX. p. 67. n. 116. (1819).
Pap. Paris. Zinken-Sommer. Nova Acta Acad. Nat. Cur. XV. p. 142. (1831).

Much the appearance of *Pap. Paris.* Expanse 4.38 inches. The shining spot is much larger, more sinuated posteriorly, nearly touching the outer margin, and produced interiorly in a point, reaching almost to the abdominal margin. The violet arc in the iris of the anal ocellus is much more distinct than in *Paris;* tail, much less, and the large brilliant patch on the hind wings, has a changeable green tinge; indentations, yellowish-white.

Below, the transverse fasciæ of the fore wings are not so broad, and become yellowish. Hind wings have the violet arcs of the marginal ocellate spots much larger, and situated anterior to, instead of within the iris, as in *Paris.*

Hab.—Java, (Coll. Boisd: Brit. Mus.: E. I. Co.)

Var. *a.* *Pap. Arjuna.* Horsf.
G. R. Gray, Cat. Lep. Brit. Mus. Pt. I. p. 17. n. 69. (1852).
G. R. Gray, List. Lep. Brit. Mus. Pt. I. p. 21. (1856).

"Larger in size, and more distinctly spotted with golden green, and without the line that runs along the outer margin of the primary wings."—*Gray.*

Hab.—Java, (In my collection.)
Borneo, (Coll. Brit. Mus.)

Larva: "Feeds on a species of *Citrus*, December."—*Horsf.*

Pea green, covered with bluish-white spots; a lateral white line extending from the head to the middle of the fourth segment, uniting across the back at each extremity; a bright red spot near this line, on the third segment; a transverse black line edged with blue between the fourth and fifth segments; pale blue transverse lines, between each of the following rings, uniting with a sub-lateral line of the same color; four oblique transverse bluish-white lines, bordered inferiorly with reddish-brown on the five terminal segments; the first extending through two segments. Length about 2—2.25 inches.

Pupa greenish; wing-cases outlined with red; some red spots on the breast; much curved; head bifid.

The description of both Larva and Pupa I have taken from the figures in Cat. Lep. Mus. E I. Co. I. t. 3. f. 7. 7a.; so that if incorrect, the fault is not in the descriptions, but in the figures, from which they were made.

11. **Pap. Lorquini**, nov. sp.

Female.—Body dark brown; thorax powdered with golden green atoms.

Fore wings dark brown, thickly sprinkled with light yellowish-green dots; a broad, sub-marginal light brown band, near the exterior margin, of equal width throughout its entire length; the brown space, between it and the margin, containing no greenish atoms; indentations whitish.

Hind wings, black, irrorated with shining particles; those on the anterior portion, blue; on the posterior, bright green; a marginal row of six large lunules, and an anal ocellus; the two upper, violet blue; the four following, reddish-brown, each containing an indistinct violet arc; anal eye of the same color, but fulvous posteriorly; tail, broad, spatulate, a few scattered blue atoms; emarginations, white, very small, excepting the two nearest the anal angle, which are very large, and yellow. Expanse 4.81 inches.

Below, brownish-black, base of the wings powdered with greenish-white atoms; a grayish sub-marginal band on the fore wings, corresponding in position to that above, but much narrower; hind wings having six reddish-brown sub-marginal lunes, the first of which is a quadrant; the three following very irregular, being recurved exteriorly, and the fifth and sixth confluent with each other, the last touching the anal ocellus, which is the same as above; indentations very large, fulvous, edged with white on the margin.

Hab.—Philippines, (In my collection.)

I take pleasure in naming this fine species after Mr. E. F. Lorquin, who sent it to me as the female of *Paris*, but from which it is entirely different. Its nearest ally is *Pap. Bianor*, but it is separated from this by the transverse band on the fore wings, both above and below, by the style of irroration in the hind wings, by its lunules, and by the small size, and color of the emarginations; below, by the sub-marginal lunules and the indentations; and by the want of those brown hairs on the posterior nervules of the fore wings, found upon the upper surface of *P. Bianor*.

12. **Pap. Palinurus**, Fabr.
Pap. Palinurus Fab. Ent. Syst. III. i. p. 5. n. 12. (1793).
Godt. Encyc. IX. p. 66. n. 112. (1819).
Boisd., Sp. Gén. I. p. 207. n. 21. (1836).
De Haan, Verh. Natural Gesch. p. 28? (1839).
Guérin. Rev. Zool. t. 1. f. 2. (1840).
E. Doubled., List. Lep Brit. Mus. Pt. I. p. 4. (1844).
Diurnal Lepidopt., I. p. 11. n. 51. (1846).
G. R. Gray, Cat. Lep. Brit. Mus. Pt. I. p. 17. n. 70. (1852).
" List. Lep. Brit. Mus. Pt. I. p. 21. (1856).
Pap. Crino. p. Godt. Encyc. IX. p. 66. n. 113. (1819).
Boisd., Sp. Gén. I. p. 207. n. 20. (1836).
Pap. Regulus Stoll, t. 41. f. 1. 1*b*. (1791).
Laertias Regulus Hübn., Verz. bek. Schmett. p. 84. (1816).

Upper surface brown, densely powdered with shining green atoms, within, a continuous bluish-green transverse band, broad, and extending from the middle of the costal margin of the anterior wings to the anal margin of the posterior wings; on the primaries, it gradually widens towards the inner margin; on the secondaries, it is widest in the middle, tapering towards the extremities; beyond this band, on the fore wings, the green atoms become fewer, and there are none on the hind wings save a submarginal row of five crescents, composed of very bright green atoms, the first of these in some specimens is partly whitish; a large white lune at the outer angle; anal spot ferruginous, the upper part of the iris separated from a black arc by some green atoms. Indentations white; that on the anal margin, fulvous. Expanse 4.13 inches; tail brown, spatulate.

Below, brown, irrorated with greenish-white dots, outer half of fore wings ash-gray; a marginal cinereous band on the hind wings, containing a large white lunule, having a black spot immediately posterior to it; five oblong reddish brown spots, each compressed between two deep black lines, the upper of which lines is irrorated by an arc of blue atoms, more or less distinct; and an anal ocellus, the pupil of which is black, the upper part of the iris reddish, surmounted by some blue atoms and a black spot, and the lower part, fulvous; the first sub-marginal oblong spot has sometimes a white mark above it.

Hab.—Philippines, (In my collection.)
"India," (G. R. Gray.)
"Tranquebar," (Fabricius.)

13. **Pap. Helenus**, Linné.

Pap. Helenus. Clerck, Icon. t. 13. f. 2. (1759).*
Linn. Syst. Nat. II. p. 754. n. 4. (1767).
Cram. II. t. 153. f. A. B. (1779).
Herbst, t. 14. f. 2. (1784).
Fab. Ent. Syst. III. i. p. 2. n. 3. (1793).
Esper, Ausl. Schmett. t. 2. f. 2. (1801).
Godt. Encyc. IX. p. 68. n. 117, (1819).
Lucas, Pap. Exot. p. 24. t. 15. f. 2. (1835).
Boisd., Sp. Gén. I. p. 211. n. 25. (1836).
De Haan, Verh. Nat. Gesch. p. 30. (1839).
E. Doubled., List. Lep. Brit. Mus. Pt. I. p. 4. (1844).
Diurnal Lepidoptera, I. p. 11. n. 57. (1846).
G. R. Gray, Cat. Lep. Brit. Mus. Pt. I. p. 18. n. 77. (1852).
" List. Lep. Brit. Mus. Pt. I. p. 23. (1856).
Cat. Lep. Mus. E. I. Co. I. p. 101. n. 205. (1857).
Achillides Helenus. Hübn., Verz. bek. Schmett. p. 85. (1816).

Upper surface, brown-black; some dark longitudinal rays visible in the discoidal cellule, and towards the extremity of the superior wings. Inferior wings with a large white spot near the outer angle, rounded within, indented externally, and divided by two nervules into three unequal parts; a red anal lunule, more or less indistinct; tail large, black and spatulate; crenulations white. Expanse 5.31 inches.

Below, a row of sub-marginal oblong grayish-white dashes on the fore wings; the hind wings have, in addition to the large white spot, a marginal row of seven spots, rusty red, of which the five outer are lunulate, the two inner ocelliform; that at the anal angle is confluent at its upper extremity with a lunule of the same color, both being crossed by a violet ray. Body black, studded with white points.

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* In order to guard against the possibility of any supposition that I have erroneously assigned to Linné, species belonging to Clerck, in this, and other instances, I must state that the precedence given him in the synonymy, is in the order of the date, and not due to any priority of nomenclature; for though he figured the species, their methodical classification was reserved, intact, for Linnæus.

Hab.—Philippines, (In my collection.)
Northern India, China, (Coll. Brit. Mus.)
China, Java, Sumatra, (Coll. Boisd.)
Java, Darjeeling, (Coll. E. I. Co.)

The following descriptions of the Larva and Pupa are taken from Plate III. f. 2. 2*a*. Cat. Lep. Mus. E. I. Co., illustrative of the species from Canara, where they were discovered by S. N. Ward, Esq.

Larva, three inches long; dark green above, brownish below; a short transverse light green band on the third segment, marked with some irregular black lines, and having a pink ocellus, the pupil of which is black, at each end; a transverse brownish line, extending clear across the back on the fourth segment, containing some dark brown spots; an irregular oblique transverse white band on the seventh and eighth segments; on the ninth segment an irregular transverse white line, having, when viewed laterally, the appearance of an L with its base turned in the opposite direction; anal segment partly white.

Chrysalis, very much curved, head bifid; wing cases dark brown, with black lines; lower part of abdomen, reddish; above, bluish, with some prominent reddish-brown points; thorax, yellowish-red.

Lucas' figure of the imago is without a tail.

14. **Pap. varasi,** nov. sp.

Upper surface, blackish-brown; five deep black rays in the discoidal cellule; hind wings with a large white spot towards the outer angle, as in *Helenus*, but is divided by three nervules into four unequal spots; two bright ferruginous lunules, one on the abdominal margin, the other in the next interspace near the exterior margin; indentations white, narrow; tail black, spatulate, not so large as *Helenus*. Expanse 4.75 inches.

Under surface brown-black; transverse grayish fasciæ on the fore wings, as in the analogous species; discoidal cells on both anterior and posterior wings are striated with whitish rays; the nerves, also, near the base, are white; base of posterior wings powdered with grayish atoms; a sub-marginal row of seven whitish and fulvous spots and lunules, each preceded by a large lunate indentation on the margin, all white excepting the two last, which are slightly fulvous and united to the sub-marginal spots; that at the anal angle is reddish-brown, very large, and united with another lune, still larger, separated from the large white spot by one interspace only; these two lunes contain a common violet ray; the first sub-marginal spot is a round whitish dot, the the three following, oblong dashes, and the three terminal, lunules.

Body black, prothorax pointed with white.

Hab.—Philippines, (In my collection.)

Closely allied to *Pap. Iswara*, White, but is considerably smaller.

15. **Pap. Pammon**, Linné.
Pap. Pammon. Clerck, Icon. t. 14. f. 2. ♂. (1759).
Linn. Syst. Nat. II. p. 746. n. 8. (1767).
Cram., II. t. 141. f. B. (1779).
Herbst, t. 19. f. 4. (1788).
Fab. Ent. Syst. III. i. p. 7. n. 20. (1793).
Esper, Ausl. Schmett. t. 4. f. 1; t. 40. f. 1. (1801).
Godt. Encyc. IX. p. 74. n. 139. (1819).
Boisd., Sp. Gén. I. p. 272. n. 96. (1836).
E. Doubled., List. Lep. Brit. Mus. Pt. I. p. 10. (1844).
Diurnal Lepidopt., I. p. 11. n. 62. (1846).
G. R. Gray, Cat. Lep. Br. Mus. Pt. I. p. 19. n. 82. (1852).
" List. Lep. Brit. Mus. Pt. I. p. 24. (1856).
Cat. Lep. Mus. E. I. Co. I. p. 104. n. 209. (1857).
Lærtias Pammon. Hübn., Verz. bek. Schmett. p. 84. (1816).
Princeps Heroicus Pammon. Hübn., Samml. Exot. Schmett. I. t. 108. (1806).

Upper surface black; a row of small marginal spots, white, increasing in size towards the inner margin, on the fore wings. On the hind wings a narrow macular band, composed of seven white spots; the anal spot, which is sometimes yellowish, is divided by a black nervure, and is followed by a small group of blue atoms. Expanse 3.75—4.13 inches. Body black, some grayish spots on the prothorax and at the base of the wings.

R. Templeton, Esq., states in Ent. Trans. V. p. 44: "The male of *P. Pammon* has a little white mark near the anal angle of the posterior wing; the female, an ocellus resembling that of *P. Polytes;* all the other markings are the same in both (sexes) except in the females, they are larger and longer." I have failed to perceive this ocellus in my female; perhaps local and climatal influence have had their force in abrogating this distinction; the insects from which he has taken his notes were from Ceylon, mine from China and the Philippines.

Hab.—♂. Philippines, Java, ♀ China, (In my collection.)
Indian Archipelago, Asia, (Coll. Boisd.)
Penang, N. India, China, (Coll. Brit. Mus.)
Java, N. India, Chusan, (Coll. E. I. Co.)

Var. α. *Pap. Pammon.* G. R. Gray, Cat. Lep. Brit. Mus. Pt. I. p. 19. n. 82. (1852).
Pap. Cyrus. Fab. Ent. Syst. III. i. p. 7. n. 19. (1793).
Boisd., Sp. Gén. I. p. 273. n. 96. (1836).
Lærtias Cyrus. Hübn., Samml. Exot. Schmett. II. t. 96. (1806—1824).

Boisduval says "this variety differs from the ordinary male in having the marginal lunules on the under surface of the secondaries of a reddish-yellow, instead of white or yellowish."

Pap. Pammon. var Stoll, t. 33. f. 1. 1*a*. (1791).

"Another variety, in which the fore wings are deprived of the marginal white spots."—*Boisd.*

Hab.—"India," (Fabricius.)

Var. β. *Pap. Pammon.* G. R. Gray, Cat. Lep. Br. Mus. Pt. I. p. 19. n. 82. (1852).

Caudal appendages very short

Hab.—Java, (Coll. Brit. Mus.)

Var. γ. *Pap. Pammon.* G. R. Gray, Cat. Lep. Br. Mus. Pt. I. p. 19. n. 82. (1852).
Pap. Ledebouria. Eschscholtz. Voy. Kotzebue. III. t. 3. f. 7. (1830).
Pap. Ledebourus. De Haan.
Pap. Alphenor. (Boisd.) ♂ De Haan, Verh. Nat. Gesch. p. 41. (1839).

"Superior wings, as in *Pammon* ♂. Inferior wings, without tail, the hindmost tooth being only a little produced; emarginations more white, and larger than in *Pammon* ♂, preceded by a sub-marginal row of small white lunules; the central transverse band a little longer, formed of oval spots. Below, the marginal lunules of greater size; the anal spot colored yellow.

"*Hab.*—Celebes, (Coll. M. Payen.)"—*Boisd.*
"Manilla."—*Eschscholtz.*

Pap. Pammon "at Chusan, was observed from July to September, inclusive."—(Dr. Cantor's Notes.)

"This is the most common species of the genus, being sometimes seen in dozens in the same field at Rajpore, and elsewhere in the Dhoon, during the months of August and September; nor are they uncommon in the glens of the mountains."—Capt. T. Hutton, Trans. Ent. Soc. V. p. 50.

Larva, Cat. Lep. Mus. E. I. Co. I. Plate III. f. 4. 4*a*. (1857).
Boisd., Sp. Gén. I. p. 274. n. 96. (1836).

Dark green; a narrow transverse band on the third segment, marked with white, and having a round black spot at the extremity; a grayish-brown transverse band on the fourth, uniting with the brown of abdomen below. An oblique transverse brown band on the seventh and eighth segments; another, incomplete on the ninth ring, above which there is a round spot; length about 1.75 inches.

Pupa, much curved; head, bifid; some spinous processes on the back, grayish-brown, marked with black and a little brown.

Larva "feeds on a species of *Citrus*, bearing the native name of *Juruk*, November to April."

"NOTE.—Every variety of *Juruk* or Orange (*Gulog*, *Kina*, *Pichet*, &c.) produces a different butterfly, although scarcely any difference appears in the caterpillar."—*Horsfield*.

"Larvæ particularly destructive to the lime trees in Ceylon, as are also those of *P. Polymnestor*, *Polydorus* and *Hector*."—*R. Templeton, Esq.*

16. **Pap. Polytes**, Linné.

Pap. Polytes. Clerck, Icon. t. 14. f. 1. (1759).
Linn. Syst. Nat. II. p. 746. n. 5. (1767).
Cram., III. t. 255. f. A. B. C. (1782).
Herbst, t. 15. f. 2 ♀. t. 20; f. 3, 4 ♂. (1784).
Fab. Ent. Syst. III. i. p. 2. n. 5. (1793).
Esper, Ausl. Schmett. t. 3. f. 1; t. 12. f. 1. (1801).
G. R. Gray, Cat. Lep. Br. Mus. Pt. I. p. 20. n. 83. (1852).
" List. Lep. Br. Mus. Pt. I. p. 25. (1856).
Cat. Lep. Mus. E. I. Co., I. p. 103. n. 208. (1857).
Menelaides Polytes. Hübn., Verz. bek. Schmett. p. 85. (1816).
Menelaides Alphenor. pt. Hübn., Verz. bek. Schmett. p. 85. (1816).
Princeps Heroicus Stichius. Hübn., Samml. Exot. Schmett. I. t. 3. (1806).
Pap. Pammon. ♀ Boisd., Sp. Gén. I. p. 272. n. 96. (1836).
De Haan, Verh. Naturl. Gesch. p. 41. (1839).
E. Doubled., List. Lep. Br. Mus. Pt. I. p. 11. (1844).
Diurnal Lepidoptera, I. p. 11. n. 62. (1846).

Wings, blackish-brown. Primaries light brown on the outer half, divided by longitudinal dark rays; exterior margin dentate; indentations white.

Secondaries have a large white or yellowish-white spot in their middle, palmated and divided by the nervules into three, four or five parts.

of which the two inner are more or less confluent posteriorly, with an oblong spot of reddish-brown situated upon the anal margin; six submarginal lunes, reddish-brown; an anal oblong mark of the same color, containing a round black dot; all the red parts irrorated with violet atoms; indentations reddish-yellow and whitish; expanse 4.25—4.38 inches; tail short, blackish, spatulate.

Below, as above, the sub-marginal lunules sometimes preceded by small groups of violet atoms.

Body brownish; prothorax pointed with white, and some white spots at the base of the wings and insertion of the abdomen; two lateral white lines, enclosing a row of yellow dots on each side of the abdomen.

Hab.—♂ Philippines, ♀ China, (In my collection.)
Indian Archipelago, Asia, (Coll. Boisd.)
♂ ♀ Java, Calcutta, N. India, Chusan, (Coll. E. I. Co.)
China, Ceylon, N. India, Java, Gulf of Martaban, N. China, Sandwich Islands, (Coll. Brit. Mus.)

Var. *a*. *Pap. Polytes.* G. R. Gray, Cat. Lep. Br. Mus. Pt. I. p. 20. n. 83. (1852).
Pap. Numa. Weber, Observ. Entom. Kiel. p. 106. (1801).
Pap. Polytes. var. De Haan, Verh. Naturl. Gesch. p. 41. (1839).

Hab.—Indian Archipelago.

In a specimen which I have, from China, there are two rays, composed of violet atoms, extending from each extremity of the sixth submarginal lunule to the palmate white spot.

"Not uncommon in the Dhoon during the rainy season, and at Rajpore, at the foot of the Hills, it is frequently met with." (Capt. T. Hutton.)

"At Chusan, the perfect insect appears during August and September." (Dr. Cantor's Notes.)

Larva. Cat. Lep. Mus. E. I. Co., I. t. III. f. 3. (1857).

Not quite so large as that of *P. Pammon*, and light green; transverse bands on the third and fourth segments, as in that species, the second, however, being dark brown; a white stigmated line, bordered posteriorly with brown, and a white oblique transverse line on the seventh and eighth segments. Anterior portion of the body, below the white lateral line, dark brown; posterior segments nearly white, or light brownish-yellow.

"In Java, the larva feeds on a species of *Citrus*, bearing the native name of *Juruk*, from January to May."—*Horsfield.*

Pupa. Cat. Lep. Mus. E. I. Co., I. t. III. f. 3*a*. (1857).

Not so much arched as in *Pap. Pammon;* of a greenish brown, mingled with darker spots; prominent processes on all of the abdominal segments, while in *Pammon* they are found only upon the first two rings.

17. **Pap. Alphenor,** Cram.

Pap. Alphenor. Cram., I. t. 90. f. B. (1779).
Esper, Ausl. Schmett. t. 37. f. 1. (1801).
Boisd., Sp. Gén. I. p. 274. n. 97. (1836).
Diurnal Lepidopt., I. p. 12. n. 65. (1846).
G. R. Gray, Cat. Lep. Brit. Mus. Pt. I. p. 20. n. 85. (1852).
Pap. Polytes. var. Godt. Encyc. IX. p. 71. n. 126. (1819).
Menelaides Alphenor. pt. Hübn., Verz. bek. Schmett. p. 85. (1816).

Rather smaller than *P. Polytes;* the longitudinal rays on the outer half of the primary wings of that species become whitish in this, especially towards the internal angle. Inferior wings tailed, long and spatulate; disc contains a white spot, not palmate, divided by very narrow grayish nervures, into four parts; the posterior and inner portions of which are in conjunction with a large reddish-brown spot, divided into three parts by black nervules; that on the anal margin containing a large round black dot; the middle one is much the longest, touching inferiorly the last of a row of six sub-marginal reddish-brown lunules, which are rather larger than those of *Polytes;* indentations of both anterior and posterior wings white, excepting the anal, which is a little fulvous; expanse 4.13 inches; the red parts near the anal margin are powdered with violet atoms.

Below, the same as above, but the white indentations on the posterior wings are much larger and fulvous at the base. Body, the same as *Polytes*, with the addition of a ventral white band.

Hab.— ♀ Philippines, (In my collection.)
"Celebes, (Coll. M. Payen.)"—*Boisd.*
"Amboina."—*Cram.*
"China?" Cat. Lep. Brit. Mus.

Boisduval says, it is not tailed, but that the posterior wings are simply produced in a short tooth. This is, then, either a sexual distinction, or the tail was excised in the specimens which he examined, for in mine, which agrees with his description in every other particular, it is not only very distinct, but also a little longer than that of *Pap. Polytes.*

18. **Pap. Demoleus,** Linné.
Pap. Demoleus. Roesel, Ins. Add. t. 1. f. 2, 3. (1746).*
Linn. Syst. Nat. I. p. 753. n. 46. (1767).
Cram., III. t. 231. f. A. B. (1782).
Fabr. Ent. Syst. III. i. p. 34. n. 101. (1793).
Herbst, Pap. t. 36. f. 3, 4. (1796).
Donov., Ins. China, Pl. 29. f. 1. (1798).
Pal. de Beauv. Ins. Afr. et. Amer. t. 2. b. f. 2. (1805).
Godt. Encyc. IX. p. 43. n. 52. (1819).
Boisd. Faune. de Madag. p. 12. (1834).
Lucas, Pap. Exot. p. t. 9. f. 2. (1835).
Boisd., Sp. Gén. I. p. 237. n. 60. (1836).
E. Doubled., Cat. Lep. Brit. Mus. Pt. I. p. 6. (1844).
Westw., Arc. Ent. p. 148. (1845).
Diurnal Lepidoptera, I. p. 12. n. 70. (1846).
G. R. Gray, Cat. Lep. Brit. Mus. Pt. I. p. 21. n. 91. (1852).
Orpheides Demoleus. Hübn., Verz. bek. Schmett. p. 86. (1816).
Princeps dominans Demoleus. Hübn., Samml. Exot. Schmett. I. t. 115. (1806–1824).
Papilio Demodocus. Esper, Ausl. Schmett. t. 51. f. 1. (1801).

Wings black, thickly powdered with yellow atoms; the anterior wings have a number of unequal, irregular and scattered yellow spots on the disc; a double row of yellow marks on the exterior margin, of which the marginal are much the smallest, and are situated upon the indentations; the base and costal margin are marked with yellow points.

Posterior wings are traversed above the middle by a nearly straight yellow line, having an ocellus upon each extremity; that infringing on the costal border is slightly reddish, and surrounded by a blue iris; that on the abdominal margin has the superior half, blue, the inferior, reddish-brown; the outer margin is obtusely dentate, and furnished with the double row of marginal lunules, as in the fore wings; expanse 3.75 inches.

Under surface paler than above, and possessing all its characteristics, with the addition of having the base rayed with yellow.

The posterior wings also present upon a deeper ground color than the rest of the surface, six reddish spots, inwardly edged with blue, of which one is at the extremity of the discoidal cellule; the other five forming an irregular transverse band beyond it, upon the disc. Following these are the large yellow sub-marginal lunules, separated from the emarginate spots by a series of black arches.

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* The remarks made upon the synonymy of *Pap. Polytes*, are equally applicable in this and similar cases.

Body black, with a yellow line on each side of the head and thorax; yellow below, with longitudinal black streaks; antennæ black, speckled with reddish towards the club.

Hab.—Cape of Good Hope, Madagascar, (In my collection.)
Cape of Good Hope, Coast of Guinea, Senegal, Madagascar, (Coll. Boisd.)
South and West Africa, (Coll. Brit. Mus.)

"In Senegal, the larva has been reared upon a *Citrus*."—*Boisd.*

19. **Pap. Erithonius**, Cram.
P. Erithonius. Cram., III. t. 232. f. A. B. (1780).
Herbst, Pap. t. 36. f. 5, 6. (1796).
Diurnal Lepidopt., I. p. 12. n. 71. (1846).
G. R. Gray, Cat. Lep. Brit. Mus. Pt. I. p. 21. n. 92. (1852).
" List. Lep. Brit. Mus. Pt. I. p. 28. (1856).
Cat. Lep. Mus. E. I. Co. I. p. 105. n. 211. (1857).
Princeps dominans Erithonius. Hüb., Samml. Ex. Schmett. I. t. 116. (1806–1824).
Pap. Epius. Fabr. Ent. Syst. III. i. p. 35. n. 102. (1793).
Donov., Ins. of China, Pl. 29. f. 2. (1798).
Godt. Encyc. IX. p. 43. n. 53. (1819).
Boisd., Sp. Gén. I. p. 238. n. 61. (1836).
E. Doubled., List. Lep. Brit. Mus. Pt. I. p. 7. (1844).
Orpheides Epius. Hübn., Verz. bek. Schmett. p. 86. (1816).
Pap. Demoleus. apud. Esper, Ausl. Schmett. t. 50. f. 1, 4. (1801).

Wings black; primaries thickly dotted with yellow at the base, forming transverse lines; a great number of irregular yellow spots on their middle, scattered and unequal in size; a sub-marginal row of yellow spots; and another row, much less, situated upon the indentations; excepting the first, which is oblong, the spots of the sub-marginal line gradually increase towards the inner angle. These two rows are continued on the secondaries to the anal angle, becoming, however, much larger and more lunate.

A broad transverse yellow band across the upper portion of the hind wings, very irregular posteriorly, and varying considerably in the size, shape and number of the spots; having at either end a colored spot, that on the costal margin being black, (in one specimen I have, dark reddish-brown,) containing a blue arc; that on the abdominal margin bright reddish-brown, with a blue lunule above it, sometimes obsolete.

"The male of *P. Erithonius* is without the blue lunule," not entirely wanting in my specimens. "The female has it; and both sexes vary in having or not having one or two spots outside the closing vein of the discoidal cell of the lower wing; beneath, the markings in both are nearly identical, lunule and all." *

Below, same general markings as above, on the fore wings, but rather paler; base covered with yellowish-white radii; a sinuous line of fulvous atoms near the apex. Hind wings, anterior part, entirely yellowish-white, crossed by a transverse black line, and divided into spots by the black nervures. Posterior portion of wings black, containing in its upper portion six orange spots, margined anteriorly with blue, five forming a sinuous transverse line, and the sixth, a lunule in the discoidal cell; the costal black spot contains a blue lunule, bordered with fulvous inwardly; anal spot the same as above; the sub-marginal lunules and marginal indentations are much larger than on the upper surface; expanse 3.5—3.88 inches.

Body, black above, powdered with yellow atoms, with a yellow line on each side of the head and thorax; below, yellowish.

Hab.—China, India, Phillippines, (In my collection.)
China, Bengal, (Coll. Boisd.)
Canara, Calcutta, Penang, (Coll. E. I. Co.)
Northern India, Penang, Ceylon, (Coll. Brit. Mus.)

"Occurs in the Deyrah Dhoon, and likewise in the Hills during summer. I have received it from Madras, and frequently took it at Neemuch, in Western India." †

This species is subject to considerable variation, even in what is usually considered its normal condition. I have already referred to the differences in the transverse band of the hind wings on the upper surface, and there is also some in the shape and size of some of the spots on the fore wings; but it is on the under surface that we see the greatest variations; the fore wings are comparatively uniform, with the exception that there are two yellow spots near the extremity of the cell, which are sometimes united; on the hind wings there is great difference in the size of the sub-marginal lunules, sometimes being so large as to give the idea that the wing is yellowish-white, with transverse and sinuate black bands upon it; also in the size of the orange spots, which are sometimes bordered on both sides with blue.

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* R. Templeton, Esq., Trans. Ent. Soc. V. p. 44. (1847).

† Capt. T. Hutton, Proc. Ent. Soc. V. p. 48. (1847).

Var. *a*. *Pap. Erithonius*. G. R. Gray, Cat. Lep. Brit. Mus. Pt. I. p. 21. n. 92. (1852).
Pap. Sthenelus. McLeay, King's Surv. of Aus. App. p. 457. n. 133. (1827).
Boisd., Sp. Gén. I. p. 239. n. 62. (1836).

"This species closely resembles *P. Erithonius*, and is to be distinguished from it only by a large yellow spot near the middle of the inner margin of the fore wings, which in *Erithonius* and *Demolius* is divided into two parts; and by one little yellow spot, joined to the outer edge of the transverse band of the hind wings, whilst in *Erithonius* there are two or three.

"This species replaces *Erithonius* on the west coast of Australia."—*Boisd*.

Hab.—Australia, (Coll. Brit. Mus.)

Var. *β*. *Pap. Erithonius*. nov. var.

This differs from the normal state in having the upper surface densely powdered with very fine yellow atoms; in the absence of a yellow spot just within the line of the sub-marginal spots; and in the shape of the lower spot in the cell, which has the appearance of an inverted comma. On the hind wings the sub-marginal spots are nearly square; the transverse yellow band is not near so irregular as in the typical condition; the projecting yellow spots are so reduced in size as to be nearly in a straight line, though not so much as in *Pap. Demoleus;* and the reddish-brown anal spot contains, in its upper portion, a deep velvety black round dot, surmounting which there is a light blue lunule.

Below, as on the upper surface, with the addition of a long, fulvous, sinuate band near the apex of the primaries; and that the sub-marginal lines on the secondaries are all united, forming a broad, pale yellow sinuate band.

Hab.—Philippines, (In my collection.)

Larva. Cat. Lep. Mus. E. I. Co., I. p. 106. t. III. f. 6. 6*a*. (1857).

The Caterpillar feeds upon the Lime Orange, Citron and "Bel" trees, arrives at maturity in the early part of July (1st—8th), and transforms; the imago emerging in from eight to ten days.

"Green, with a reddish or orange colored head; the fourth segment of the body is also bordered with the same color, and there is a lateral oblique stripe on the hinder parts, which is blackish and edged with white; the spiracles are black; there are two short tentacular horns projecting from the anterior segment and two others from the anal segment, beneath which latter is a whitish stripe, running obliquely forwards and downwards; a white lateral stripe above the legs, which are yellowish."*

"Very common throughout the Bengal presidency; the larva has two processes (above the head) very pliable and completely retractile. The scent of these processes is that of very rotten oranges, and is overpowering in the extreme, and does not leave the hand, when once infected, for many hours, even after several washings. The larva, when touched, shrugs up its head, and only displays the nauseous filiments when much or repeatedly irritated, and then it endeavors to smear the irritating body by dragging them over and about it."†

"The eggs are laid singly on the tips of the leaves, and generally on the upper side. The larva is at first of a greenish brown."—*Mrs. Hamilton.*

This description is so very different from that given by Fabricius, and from the drawings of Esper, and that in the Cat. Lep. Mus. E. I. Co., that I shall append all three, leaving to future investigators the task of discovering which corresponds to the true larva of this species.

"Yellowish-green, with the head brick-red, and two short horns at the extremity of the body."—*Fab.*

"Caterpillar of a reddish color, with the openings upon the middle of a pale yellow, pointed with black; that which separates the fourth from the fifth segment is black, embroidered with yellow; beyond this there are some very obscure marblings on the side, and a red ocellate spot on the middle of the third segment.—Esper."—*Boisd.*

The figures from which the following description is taken, were drawn from Larvæ and Pupæ, discovered in Madras by S. N. Ward, Esq., whose accuracy in entomological delineations is well known.

Dark green; head brownish; a white lateral stripe above the legs, which are also brownish; a short transverse line on the third ring, brownish, pointed with red; and another at the end of the fourth seg-

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* Capt. T. Hutton, Proc. Ent. Soc. V. p. 48. (1847).

† Capt. Mortimer Slater, MS. "Notes," p. 438.

ment, of the same color, serrated anteriorly; stigmatæ red; anal segment slightly furcated at its extremity.

Pupa grayish-brown, with darker lines, more especially on the abdominal segments and on the prothorax; wing cases shaded with black.

20. **Pap. Horsfieldii**, nov. sp.

Upper surface black; a row of white marginal spots, increasing in size towards the inner angle. Secondary wings have a broad transverse macular white band on the disc, composed of seven spots; that on the anal margin being somewhat yellow; indentations white, narrow; expanse 4.25 inches.

Under surface of fore wings same as the upper; the hind wings have, in addition to the macular transverse band, which is here entirely white, a small fulvous lune on the abdominal margin, just below the last spot of the band; and a sub-marginal row of oblong white dashes, preceding the white indentations.

Body black; thorax beneath marked with white spots.

Female differs in having the anal lunule bright red, surmounted by a narrow violet line; a group of white atoms posterior to the sixth macular spot; and in having the sub-marginal spots and lunules, yellowish; expanse 4.39 inches.

Hab.—Philippines, (In my collection.)

Allied to *Pap. Phestus*, Boisd.

I take pleasure in naming this species after Thomas Horsfield, Esq., who has contributed almost all the knowledge that we possess of the metamorphoses of eastern exotic Lepidoptera, by his indefatigable exertions in that most difficult and tedious branch of Lepidopterology.

21. **Pap. Erectheus**, Donovan.

Pap. Erectheus. Donov. Ins. New Holl. Pl. 15. (1805).
Godt. Encyc. IX. p. 31. n. 15. (1819).
Lucas, Pap. Exot. p. 17. t. 9. f. 1. (1835).
Boisd., Sp. Gén. I. p. 215. n. 31. (1836).
E. Doubled., Cat. Lep. Brit. Mus. Pt. I. p. (1844).
Diurnal Lepidopt., I. p. 12. n. 77. (1846).
G. R. Gray, Cat. Lep. Brit. Mus. Pt. I. p. 22. n. 99. (1852).
" List. Lep. Brit. Mus. Pt. I. p. 29. (1856).
Nestorides Erectheus. Hübn., Samml. Exot. Schmett. II. t. 108. (1806—1824).
♀ *Pap. Ægeus*. Donov., Ins. New Holl. Pl. 14. (1805).
Godt. Encyc. IX. p. 31. n. 17. (1819).
Nestorides Ægeus. Hübn., Samml. Exot. Schmett. II. t. 107. (1806—1824).
♂ ♀ *Pap. Gambrisius*. De Haan, Verh. Nat. Gesch. p. 30. (1839).

Male.—Anterior wings black; a transverse yellow band near the apex, composed of six spots, of which the first two are small oblong dashes on the costa, at about two-thirds its length from the base, the three following irregular, and the sixth, just above the middle of the outer margin, is sagittate; beyond this band, longitudinal lines are produced to the outer margin, of fine yellow atoms; indentations white.

Posterior wings black, with a broad greenish-gray band on the disc, partially divided by the black nervules, and very deeply indentate exteriorly; abdominal margin marked with a brick-red spot, containing a violet arc; below the anal sections of the transverse band, some fine blue atoms, forming two nearly obsolete arcs; indentations white; expanse 4. inches.

Body brown; some yellow spots on the prothorax, and the first joint of the palpi.

Below, the fore wings colored as above, with the addition of another spot to the apical band, the spots of which are also larger. On the hind wings there are three rows of lunules: the first, sub-marginal, contains seven lunes, those on the costal and anal margin being much the largest, the others gradually enlarging towards the costal margin; the anal contains a violet arc: the second row is composed of six, formed of blue atoms, of which the three nearest the costa are sometimes obsolete; the third of six of the same color as the transverse band above, of which the two central are very large. Indentations not so long as on the upper surface.

Female.—Basal half of fore wings dark blackish-brown; exterior half grayish-white, shading into dark brown along the costa and outer margin, and traversed by dark nervules and longitudinal lines, the latter on the apical half only; wings sinuate, slightly dentate, the indentations occupied by semi-lunes, white, becoming fulvous towards the inner angle; extremity of the discoidal cell marked with a large black crescent.

Hind wings blackish-brown, a central transverse band of pure white, widest in the middle, and tapering towards either margin. Posterior to this, three rows of lunules; the first, large, are formed of blue atoms, of which the two nearest the abdominal margin are the only constant ones, the others being most frequently obsolete; these are followed by a row of six large blood-red lunes; and those of the third row are situated on the indentations, fulvous, bordered with white exteriorly; between the fourth and fifth indentations, the wing is produced into a a short, obtuse, rounded tooth; an anal spot, blood red, surmounted by a violet blue arc; expanse 5.88 inches.

Below, the fore wings as above; the hind wings have the blue lunules, complete, the red and marginal crescents also much larger; that one of the latter situated on the anal indentation, rises as a short fulvous dash into the first median interspace; nervules, traversing the central white band, black.

Body black; yellow spots on the prothorax, first joint of palpi yellow; abdomen underneath rayed with yellow; anus, fulvous.

Hab.—Australia, (In my collection.)
Australia, (Coll. Brit. Mus.)
Australia, (Coll. Boisd.)
"Australia, (Coll. Lacordaire.)" Boisd.
"New Guinea, (Coll. Jarden des Plantes.)" Boisd.
"Arrou Islands, (Coll. M. Payen.)" Boisd.

Var. α. *Pap. Erectheus.* G. R. Gray, Cat. Lep. Br. Mus. Pt. I. p. 22. n. 99. (1852).
" List. Lep. Brit. Mus. Pt. I. p. (1856).

With the marginal spots on the under surface of the secondary wings deep orange, and the lunules of blue and buff, fewer in number.

Hab.———? (Coll. Brit. Mus.)

Var. β. *Pap. Erectheus.* G. R. Gray, Cat. Lep. Br. Mus. Pt. I. p. 22. n. 99. (1852).
Pap. Erectheus. var. Voy. au Pole Sud. Lep. t. 1. f. 1, 2.

The under surface of the secondary wings with only a deep orange spot at the anal angle.

Hab.———?

Var. γ. *Pap. Erectheus.* Boisd., Sp. Gén. I. p. 215. n. 31. (1836).

"Differs in having the red lunules much less, and also preceded by some blue atoms."—*Boisd.*

Hab.—"Australia, (Laplace.)"—*Boisd.*

22. **Pap. Agamemnon,** Linné.

Pap. Agamemnon. Linn. Syst. Nat. II. p. 748. n. 22. (1767).
Herbst, Pap. t. 48. f. 1, 2. (1788).
Fabr. Ent. Syst. III. i. p. 33. n. 98. (1793).
Esper, Ausl. Schmett. t. 46. f. 1, 2. f. 3. var. (1801).
Donovan, Ins. of China, t. 27. f. 2. (1805).
Godt. Encyc. IX. p. 46. n. 63. (1819).

Boisd., Sp. Gén. I. p. 230. n. 49. (1836).
E. Doubled., List. Lep. Brit. Mus. Pt. I. p. 5. (1844).
Diurnal Lepidoptera, I. p. 14. n. 109. (1846).
G. R. Gray, Cat. Lep. Brit. Mus. Pt. I. p. 27. n. 130. (1852).
" List. Lep. Brit. Mus. Pt. I. p. 37. n. 130. (1856).
Cat. Lep. Mus. E. I. Co., p. 114. n. 229. (1857).
Pap. Agamemnon. Cram., p. 151. fig. as *Pap. Ægistus.* II. t. 106. f. C. D. (1777).
Iphiclides Agamemnon. Hübn., Verz. bek. Schmett. p. 82. (1816).

Wings black, marked with a number of greenish-yellow or sea-green spots, oval or punctiform, excepting those at the base of the secondaries, which are linear and parallel with the axis of the body; of the others, eight are contained in the discoidal cellule of the anterior wings, the outer margin of which is sinuate, and the remainder may be considered as forming two transverse rows upon the disc on both primaries and secondaries; those upon the secondaries being of nearly equal size, but the inner row on the primaries is much the largest, the spots, excepting the two nearest the inner margin, which are again contracted, dilating considerably towards the middle of the disc; the two terminal spots in this line are each divided into two parts, more or less separated by the nervures or a black line, though in some specimens they are confluent. Posterior wings have a short acute tail, varying somewhat in length; indentations white or yellowish.

"Below, brownish, with the greatest part of the spots of a paler hue. On the primaries, the origin of the costal nervure, the middle and apex of the wings, together with the base of the secondaries, are irrorated with reddish-violet; the posterior wings have near the costal edge, a little black spot, preceded anteriorly by a carmine-red lunule, and a little behind this, on the border of the discoidal cell, a similar spot; the middle of a deeper color than the rest of the surface; a red spot in the female only, near the anal angle.

"Body black, with two grayish-green rays upon the thorax and abdomen; white below, with rosy or white hairs upon the breast."—*Boisd.*

Hab.—Philippines, India, Java, (In my collection.)
China, Bengal, Java, Maluccas, Philippines, (Coll. Boisd.)
N. India, Penang, Gulf of Martaban, Ceylon, Java, Borneo, (Coll. Brit. Mus.)
Java, Silhet, Dukhun, (Coll. E. I. Co.)

Of four specimens which I have, no two exactly resemble each other.

That from India has the spots of a yellowish color, which also differ somewhat in shape from the insular specimens. The male from Java has the two terminal spots of the inner transverse macular band of the primaries entire, whilst in the others they are each distinctly subdivided; the color of the spots is also much deeper than in any of the others; expanse 3.32 inches.

Expanse of Indian specimen 3.75 inches.

Those from the Philippine Islands have the fore wings broader than either of the others, whilst the configuration and color of the the upper surface resembles that from Java, with the exception of the terminal spots, which are here separated. Expanse ♂ 3.35 inches; ♀ 4.19 inches.

Their tails are also longer than in either of the others.

It is on the under surface, however, that we find the greatest difference.

The Indian variety is of a beautiful rich umber brown, nearly the whole of the fore wings covered with a reddish-violet shade; the spots of the same color as above; those of the sub-marginal line obsolete towards the apex, and in common with the hind ones of the second row, white on the inner margin; an oblong black spot on the costa, near the apex. Basal half of posterior wings light brown, having a large white space on the middle of the costal margin, containing, in its upper extremity, a double lunule of carmine and jet-black; immediately behind this, a round white dot, surmounted by an indistinct black lunule; the transverse spots are of a dark greenish-brown, and very obscure.

The Javanese specimen differs in having the ground color darker and more dull; spots on fore wings and base of hind wings bright green; those of the outer row being more distinct.

On the hind wings there are two carmine lunules, and the transverse spots are not so dark.

In those from the Philippines the ground color is very dull, and the spots very plainly marked; scarcely any reddish-violet irrorations. In the ♂ the black lunules on the posterior wings are small, surmounted with fulvous; in the ♀ very large, a rosy lunule above.

Larva. Cat. Lep. Mus. E. I. Co., I. Pl. III. f. 9. 9*a*. (1857).

" In Java," from a figure of which insular variety the following description is drawn, " it feeds on a species of *Uvaria*, bearing the native name of *Kalak*, December."—*Horsfield.*

"Smooth, slightly attenuated towards the extremities, somewhat arched in the middle," having two projecting points from the anal segment, and a lateral green line, containing the black stigmatæ, above which it is yellowish-brown, striped longitudinally with bands of a lighter color; the segments marked also with a number of short oblique transverse brown lines, three sub-dorsal green points on the first three rings. Below the lateral line, pink and fulvous.

Chrysalis brownish, with two greenish lines on the back, uniting towards the head; wing covers outlined in black. Not so much arcuated as in the preceding species.

This species is very common in the Philippines.

23. **Pap. Eurypylus**, Linné.
Pap. Eurypylus. Clerck, Icon. t. 28. f. 2. (1759).
Linn. Syst. Nat. II. p. 754. n. 49. (1767).
Cramer, II. t. 122. f. C. D. (1777).
Herbst, Pap. t. 37. f. 5, 6. (1788).
Fab. Ent. Syst. III. i. p. 20. n. 61. (1793).
Esper, Ausl. Schmett. t. 33. f. 1. (1801).
G. R. Gray, Cat. Lep. Brit. Mus. Pt. I. p. 28. n. 133. (1852).
" List. Lep. Brit. Mus. Pt. I. p. 38. (1856).
Cat. Lep. Mus. E. I. Co., I. p. 113. n. 227. (1857).
Zetides Eurypylus. Hübn., Verz. bek. Schmett. p. 86. (1816).
" Samml. Exot. Schmett. II. t. 106. (1806—1824).
Pap. Eurypilus. Godt. Encyc. IX. p. 45. n. 61. (1819).
Boisd., Sp. Gén. I. p. 233. n. 54. (1836).
De Haan, Verh. Naturl Gesch. p. 33. (1839).
E. Doubled., List. Lep. Brit. Mus. Pt. I. p. 6. (1844).
Diurnal Lepidopt., I. p. 14. n. 113. (1846).
Pap. Jason. Esper, Ausl. Schmett. t. 58. f. 5. (1801).

Upper surface black, traversed by a central pale green band, narrowing at its extremities, and separated on the primaries into spots of unequal size. The discoidal cell of the anterior wings contains four oblong dashes and a spot of the same color; several spots also on the costa, near the apex; a sub-marginal row of sixteen irregular spots, varying in size and form, extends from the apex of the primaries to the anal angle of the secondaries. Fore wings sinuate; indentations of hind wings greenish-white; expanse 3.5—3.63 inches.

Below, brown; the same general arrangement of the markings; the spots, however, becoming larger, of a paler hue, and having a pearly lustre. Those on the fore wings vary somewhat in different specimens, being sometimes confluent; there are two nacreous dashes inserted between the first, second and third sub-marginal spots on the posterior wings. Six lunulate carmine spots on the hind wings, of which one is situated at the extremity of a short black band, arising on the costa at about one-third its length from the base, and running to the sub-costal nervure; the others are below the transverse band, extending from the first, which is in the lower part of the cell, and is bordered interiorly with a narrow white or fulvous line, to the anal margin, and above the last of which there arises a broad black band proceeding to the costa, and disconnected with the short black band previously spoken of; on the abdominal side of which there is a red line; abdominal margin fringed with white hairs.

Body blackish; greenish-white below, with two subdorsal whitish lines on the black part of the abdomen.

Female ?—Expanse 3.63 inches. Brown; transverse band and spots pale yellowish-green on the primaries, greenish-white on the secondaries; the two black bands are united near the base of the secondary wings on both surfaces, enclosing underneath a lemon-yellow patch; the base is also yellow; the red spot near the costal margin is very small; five red lunate marks below the band, differently shaped from in the male, and the red sub-marginal line is wanting. The nacreous spots are much larger than in the male, increasing on the anterior wings from the inner angle to the apex, and assuming, on the posteriors, the form of very large lunes. Body as in the male.

Hab.—Philippines ♂ . ♀? Java ♂ , (In my collection.)
"Amboina, Celebes, Philippines, Papua, (Coll. M. Lacordaire.)" Boisd.
India, N. India, Singapore, Ceylon, Java, (Coll. Brit. Mus.)
Java, Silhet, Northern India, (Coll. E. I. Co.)

Var. *a*. *Pap. Eurypylus*. G. R. Gray, Cat. Lep. Br. Mus. Pt. I. p. 28. n. 133. (1852).
" List. Lep. Brit. Mus. Pt. I. p. 38. (1856).
Pap. Lycaon. Boisd., MSS.
Westwood, Arc. Ent. II. p. 15. (1845).
Diurnal Lepidoptera, I. p. 14. n. 112. (1846).

"A new species, very closely allied to *Pap. Eurypylus* of Clerck's Icones, and *Pap. Evemon* of Boisduval."— *Westwood*.

Hab.—Australia, (Coll. Brit. Mus.)

Var. *β*. *Pap. Eurypylus*. G. R. Gray, Cat. Lep. Brit. Mus. Pt. I. p. 28. n. 133. (1852).
" List. Lep. Brit. Mus. Pt. I. p. 38. (1856).
Pap. Eurypylus. var. De Haan, Verh. Naturl. Gesh. p. 33. (1839).
Pap. Evemon. Boisd., Sp. Gén. I. p. 234. n. 55. (1836).
E. Doubled., List. Lep. Brit. Mus. Pt. I. p. 6. (1844).
Diurnal Lepidopt., I. p. 14. n. 114. (1846).

"A third less than *Pap. Eurypilus*, which it much resembles. The green band is proportionally larger upon the internal margin of the fore wings; three of the linear dashes in the discoidal cellule are replaced by spots of the same color; abdominal margin of the secondaries furnished with brown hairs. Below, the inferior wings invariably have the red lunule on the costal margin obsolete; the marginal spots of the hind wings much larger than above, and almost cuniform. Otherwise, as in *Eurypilus*."—*Boisd.*

Hab.—"Java, Sumatra." Boisd.
——? Borneo, (Coll. Brit. Mus.)

Larva. Cat. Lep. Mus. E. I. Co., I. Pl. XII. f. 10. 10*a*. (1857).

Greenish-brown; two short tentacular horns on the first segment; anal segment forked as in *Agamemnon*, an ocellus, black and white, upon the third ring; dark stigmatæ, and a sub-lateral white line, above the feet, which are yellowish-brown.

Chrysalis; general color greenish, with a strongly developed dorsal protuberance.

24. **Pap. Sarpedon,** Linné.
Pap. Sarpedon. Roesel. Ins. IV. t. 6. f. 1. (1761).
Linn. Syst. Nat. II. p. 747. n. 15. (1767).
Cram., II. t. 122. f. D. E. (1777).
Herbst, t. 10. f. 4, 5. (1784).
Fab. Ent. Syst. III. i. p. 14. n. 41. (1793).
Esper, Ausl. Schmett. t. 8. f. 2. (1801).
Godt. Encyc. IX. p. 46. n. 62. (1819).
Lucas, Pap. Exot. p. 9. t. 5. f. 1. (1835).
Boisd., Sp. Gén. I. p. 235. n. 57. (1836).
De Haan, Verh. Naturl. Gesch. p. 34. (1839).
E. Doubled., List. Lep. Brit. Mus. Pt. I. p. 6. (1844).
Diurnal Lepidopt., I. p. 14. n. 115. (1846).
G. R. Gray, Cat. Lep. Br. Mus. Pt. I. p. 28. n. 135. (1852).
" List. Lep. Brit. Mus. Pt. I. p. 39. (1856).
Cat. Lep. Mus. E. I. Co., I. p. 113. n. 226. (1857).
Zetides Sarpedon. Hübn. Verz. bek. Schmett. p. 85. (1816).
" Samml. Exot. Schmett. III. t. 471. (1806—1824).
Chlorisses Sarpedon. Swainson, Zool. Ill. 2nd series, t. 89. (1831—1832).

Upper surface brownish-black; a broad transverse bluish-green band, common to both wings, narrowed at the extremities, and separated, towards the apex of the primaries, into rounded spots.

Secondaries obtusely dentate, a sub-marginal row of five irregular bluish-green lunes; expanse 4.13 inches.

Below, paler, with the band and spots as above, and having a nacreous reflection; six red dashes on the posterior wings; one transverse, near the base, separated from the common band by a deep black line; four lunulate, on a darker ground color than the rest of the wing, midway between the common band and the sub-marginal lunules; the sixth. on the anal margin, extends from it to the end of the bluish-green band.

Body black above; cinereous below.

Hab.—China, ♀ (In my collection.)
China, Moluccas, Papua, Java, (Coll. Boisd.)
India, Penang, Sandwich Islands, (Coll. Brit. Mus.)
Northern India, Java, Canara, (Coll. E. I. Co.)

Boisduval remarks "that specimens from Java are always much less than those from the Moluccas."

"At Masuri this is one of the commonest, but not the least beautiful, of our butterflies; it appears early in May, and is found till the end of the rains in September. It usually frequents the top of oak trees, where it flits about with a jumping or jerking flight, and is somewhat difficult to capture from its quickness, and the height at which it keeps."*

Var. α. *Pap. Sarpedon.* G. R. Gray, Cat. Lep. Br. Mus. Pt. I. p. 28. n. 135. Pl. 4. f. 1. (1852).
G. R. Gray, List. Lep. Brit. Mus. Pt. I. p. 39. (1856).

"With the oblique band on all the wings narrower."—*Gray.*

Hab.—Ceylon, (Coll. Brit. Mus.)

Var. β. *Pap. Sarpedon.* G. R. Gray, Cat. Lep. Br. Mus. Pt. I. p. 28. n. 135. (1852).
" List. Lep. Brit. Mus. Pt. I. p. 39. (1856).
Westw. Partingt. in Brit. Encyc. Butt. (1837).

"With the oblique band on all the wings extremely broad in the middle."—*G. R. Gray.*

The figure of this differs also from my specimen in having a black anal spot encircled with a white iris. Lucas' figure is much less than my specimen, and has but four sub-marginal lunules instead of five.

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* Capt. T. Hutton, Proc. Ent. Soc. V. p. 51. (1846).

Larva. Cat. Lep. Mus. E. I. Co., I. t. III. f. 8. (1857). Copied from De Haan.

Green; segments somewhat square, tapering from the third to the head; spiracles black; three lateral black dots on the three anterior rings, the last being ocellate.

"In Ceylon it feeds on the Cinnamon and Sour-sop."—*E. L. Layard.*

Pupa. Cat. Lep. Mus. E. I. Co., I. t. III. f. 8a. (1857). Copied from Mr. E. L. Layard's drawing, taken in Ceylon.

Green, with some longitudinal yellowish rays; the most striking peculiarity is the abrupt termination of the head; it is reduced to the level of the protuberance on the thorax.

25. **Pap. Moorei**, nov. sp.

Male.—Upper surface pale yellowish-white; seven transverse black bands on the primaries; all arising from the costal margin, the first extends to the inner margin; the second, as far only as the sub-median nervure: the three following are bounded by the median nervure, and are contained within the disc, the fifth being at its extremity; the sixth and seventh, which last is marginal, are continued to the inner angle, becoming confluent beyond the third sub-median nervule; the space confined between these latter two, and the fifth, is of a deeper yellow than the rest of the surface, and sub-divided into spots by the black nervules.

Base of wing somewhat greenish.

Secondary wings, of the same color, but so very thin that the markings of the lower surface can be plainly seen above; area near the exterior margin and tail, thickly powdered with dark gray atoms; a marginal row of seven black lunate spots, situated above the white indentations, an obscure sub-marginal row of the same at the upper part of the grayish area, of which the two outer are the most distinct; anal indentations yellow; tail very long and narrow; length 1.08 inches; ciliæ white; expanse 3.75 inches.

Body yellowish-white, with a black dorsal and two lateral bands.

Under surface: fore wings same as above, with the exceptions that the second band is produced a little farther than the sub-median nervure, and the sixth and seventh are not confluent.

Posterior wings yellowish; three principal transverse bands, one very narrow, extends along the sub-median nervure; the other two, much broader, arise, one at about a fourth, the other at half the length of the costa; all these are thrown into a large sub-triangular black spot, situated on the abdominal margin, and divided by two narrow white lines; beyond the third transverse band a row of seven large black rounded spots, arising also from the costa; of which the first three are confluent; the three following are arranged in the form of a triangle, the one which forms the apex being within the cell; and the seventh at the extremity of the third transverse band; the marginal and sub-marginal lunules very distinct, that one on the anal angle throwing off a broad grayish-black prolongation, nearly touching the seventh spot, and the large black patch on the anal margin; enclosing between these three, a large orange spot; some orange atoms on the lower side of this offshoot, and also in the third median interspace; tail has a whitish ray down the middle.

Hab.—Philippines, (In my collection.)

I take pleasure in dedicating this fine species to Mr. Frederick Moore, who has contributed very largely to our knowledge of Eastern Lepidoptera.

26. **Pap. Xuthus**, Linné.

Pap. Xuthus. Linn. Syst. Nat. II. p. 751. n. 34. (1767).
Drury, II. t. 9. f. 2. (1773).
Cram. I. t. 73. f. A. B. (1775).
Herbst, Pap. t. 49. f. 3, 4. (1788).
Fab. Ent. Syst. III. i. p. 32. n. 92. (1793).
Godt. Encyc. IX. p. 58. n. 90. (1819).
Lucas, Pap. Exot. p. 36. t. 19. f. 1. (1835).
Boisd., Sp. Gén. I. p. 327. n. 170. t. 1. f. 1, 2. (1836).
De Haan, Verh. Naturl. Gesch. p. 41. (1839).
Herr. Schæff. Suppl. t. 86. f. 411—413. (1843).
E. Doubled., List. Lep. Brit. Mus. Pt. I. p. 15. (1844).
Diurnal Lepidoptera, I. p. 16. n. 157. (1846).
G. R. Gray, Cat. Lep. Brit. Mus. Pt. I. p. 36. n. 178. (1852).
" List. Lep. Brit. Mus. Pt. I. p. 49. (1856).
Cat. Lep. Mus. E. I. Co. I. p. 111. n. 223. (1857).
Jasoniades Xuthus. Hübn., Verz. bek. Schmett. p. 83. (1816).

Upper surface, fore wings black; discoidal cellule contains two transverse pale yellow dashes near its extremity; farther up, four interrupted rays, of the same color, converging at the base; two broad lines below the median nervure, one very near the inner margin, and the upper is bent at a very obtuse angle; a mesial band of sagittate spots, the two upper containing a black pupil; above these, and nearer the margin, an oblong dash of grayish-blue atoms, and a rectangular yellow spot; a sub-marginal row of yellow lunules; indentations marked with narrow yellow lines.

Posterior wings, basal half yellow, divided into spots by the nervules, black and dilated; a large black spot above the sub-costal nervure, just touching the middle of the cell; exterior half black, containing a sub-marginal row of large yellow lunules, of which one limb of the fifth extends part way down the tail, which is long and tapering, but blunt at the extremity; some obscure lunules, formed of bluish-gray atoms, just below the yellow basal half; and a yellow anal spot, containing a black pupil; expanse 4.63 inches.

Body: thorax, above black, with two sub-dorsal yellow bands; abdomen yellowish-brown above, with an incomplete dorsal black band covering the first two segments only; yellow below.

Under surface, primaries, paler than above; general markings the same, though the spots and dashes are much larger; the sub-marginal lunules are confluent, and separated only by pale brown nervules; between these and the central band there is a waved grayish line, extending nearly the length of the wing.

Posterior wings, yellow space larger, veins not so much dilated; upper part of the black portion marked with seven bluish lunules, the fourth and fifth surmounted by two red spots; the sub-marginal lunules are very large, the first three containing some red atoms, the fourth assuming a quadrilateral shape; anal ocellus has the iris orange-red.

Hab.—China, (In my collection.)
"China, Thibet, Persia, Siberia." Boisd.
China, Northern Australia, (Coll. Brit. Mus.)
Northern India, Chusan, (Coll. E. I. Co.)

"At Chusan the perfect insect appears during August and September."—*Dr. Cantor's Notes.*

Larva, Cat. Lep. Mus. E. I. Co., I. Pl. IV. f. 1. (1857). Copied from De Haan's figure.

Green, with a velvety black band across each segment; some of these bands are divided laterally, the portions excised on some of the central segments have the form of an irregular *sigma*, with the curves reversed; towards the anal segment the bands are undivided; towards the head, the part cut off is simply a black dot; two long orange-colored retractile processes in the head; stigmatæ black; lower part of abdomen yellowish.

Boisduval says it feeds upon umbelliferous plants.

27. **Pap. Machaon**, Linné.
Pap. Machaon. Roesel, Ins. I. ii. t. 1. (1746).
Linn. Syst. Nat. II. p. 750. n. 33. (1767).
Herbst, Pap. t. 45. f. 1, 2. (1788).
Fabr. Ent. Syst. III. i. p. 30. n. 87. (1793).
Hübn., Eur. Schmett. f. 390, 391. (1805–1824).
Godt. Encyc. IX. p. 57. n. 89. (1819).
Boisd., Sp. Gén. I. p. 328. n. 171. (1836).
Kollar. in Hügel's Kaschmir. Pt. II. p. 406. (1842).
Herrich-Schaffer. Europ. Schmett. t. 116. (1843).
E. Doubled., List. Lep. Br. Mus. Pt. I. p. 15. (1844).
G. R. Gray, Lep. Ins. of Nepaul. p. 6. t. 3. f. 1. (1846).
Diurnal Lepidoptera, I. p. 16. n. 158. (1846).
G. R. Gray, Cat. Lep. Brit. Mus. Pt. I. p. 37. n. 180. (1852).
Nat. Library, XXIX. Duncan, p. 94. Pl. 4. f. 1. (1855).
G. R. Gray, List. Lep. Brit. Mus. Pt. I. p. 50. (1856).
Cat. Lep. Mus. E. I. Co., I. p. 111. n. 224. (1857).
Pieris Machaon. Schrank.
Jasoniades Machaon. Hübn., Verz. bek. Schmett. p. 83. (1816).
Amaryssus Machaon. Dalm. Königl. Vel. Acad. Holm. XXXVII. p. 85. (1816).

Upper surface, fore wings, base black, powdered with yellow; a broad marginal band of the same color, sinuate internally, and containing eight semi-circular yellow spots, preceded by yellow atoms, parallel with the outer margin, which is narrowly edged with yellow; central portion of wing yellow, having three large black patches on the costal margin, one within the discal areole, one at its extremity, and the third just beyond; nervules broadly bordered with black.

Posterior wings yellow; abdominal margin dusky, clothed with long yellow hairs; a very broad marginal black band, sinuate and sharply dentate interiorly, containing six large yellow lunules, which are preceded by a row of the same, very imperfectly defined, formed of blue atoms, and followed by a marginal series of yellow crescents placed on the indentations; a large round red spot on the anal angle, surmounted by a violet-blue arc anteriorly, and almost encircled by a black line; nervules dusky, and disco-cellular nervules marked with a black streak; tail black, linear; expanse 3.5—4 inches.

Under surface resembles the upper, the most considerable differences being in the marginal yellow border of both wings, and in the presence of two or three faint red spots behind the discoidal cell of the posterior wings, and another upon their outer angle; the blue lunules of the upper surface are much narrower; nervules are all broadly black; and the general color is lighter.

A broad black dorsal band upon the body, the rest of which is mostly yellow, with the exception of four short narrow ventral black lines near the anus.

Hab.—Europe. Himalayas. (In my collection.)
Europe. N. India. (Coll. Brit. Mus.)
Europe, Siberia, Syria, Egypt, Coast of Barbary, Nepaul, Cashmere. (Coll. Boisd.)
Himalaya, N. India, Kumaon, Bootan. (Coll. E. I. Co.)
"California." (Rev. J. G. Morris.)

The above description was taken from an European insect; my Himalayan specimen ♀ differs in the following respects:—it is much less, expanse being but 3 inches. On the upper surface, the black veins are more dilate; the marginal black band of the fore wings narrows towards the apex, whilst in the European specimens it is of equal width throughout, and the yellow marks contained within are oblong dashes, instead of semicircular spots. On the secondaries, the black band, sinuate only within, is separated from the black discal arc by but a very small yellow dot.

Underneath, the chief difference is, that the submarginal yellow border on the hind wings, is not continuous, but divided into lunate spots as above.

The body is totally destitute of any black ventral lines.

Var. *a*. *Pap. Machaon*. G. R. Gray, Cat. Lep. Brit. Mus. pt. I. p. 37. n. 180. (1852).
Cat. Lep. Mus. E. I. Co. I. p. 111. n. 224. (1857).
Pap. Sphyrus. Hübn. Europ. Schmett. f. 776, 777. (1805—1824).
Boisd. Sp. Gén. I. p. 329. n. 171. (1836).

Boisduval says, "this is simply a smaller insect, in which the black is more predominant."

Hab.—"Europe."—*Hübner*.

Var. *β*. ♀. *Pap. Machaon*. G. R. Gray, Cat. Lep. Br. Mus. pt. I. p. 37. n. 180. (1852).
DeHaan. Verh. Naturl. Gesch. p. 42. t. 5. f. 2. (1839).
Cat. Lep. Mus. E. I. Co. I. p. 111. n 224. (1857).

Hab.—"Japan."—*De Haan*.

"*P. Machaon* is seen on the wing at Deyrab, in the valley of the Dhoon, as early as February, and in April its larvæ are abundant there upon the Carrot. At Masuri, in the Hills, it appears in the latter end of March, and continues till October. It is abundant about Simla, and extends far into the interior."*

Larva. Nat. Library Duncan. XXIX. p. 94. t. 3. f. 1. (1855).
Cat. Lep Mus. E. I. Co. I. t. IV. f. 2. 2a. (1857).

"The larva is green, with a black velvety transverse band across each segment, bearing four spots of bright orange; it possesses the orange-colored retractile process in the head, from which exudes a liquid drop of a strong aromatic scent, when the insect is touched, precisely as in the European larva. The food is the wild and garden Carrot, and the leaves and flowers of the Radish. I have taken the larvæ at Masuri early in May, and the pupa on the 18th May."*

Pupa "is green, with a streak of yellow on each side, and an irregular row of yellow spots on the back."—*Duncan.*

In England the imago appears from May to August.

28. **Pap. dissimilis,** Linné.

♂. *Pap. dissimilis.* Clerck. Icon. t. 16. f. 2. (1759).
Linn. Syst. Nat. II. p. 782. n. 195. (1767).
Cram. I. t. 82. f. C. D. (1775).
Sulz. Gesch. Pl. 18. f. 6. (1776).
Rœmer, Gen. Ins. Pt. 18. f. 6. (1789).
Fab. Ent. Syst. III. I. p. 38. n. 113. (1793).
Herbst. Pap. t. 126. f. 2. 3. (1793).
Godt. Encyc. IX. p. 175. n. 143. (1819).
Lucas. Pap. Exot. p. 46. t. 23. f. 2. (1835).
Boisd. Sp. Gén. I. p. 377. n. 224. (1836).
E. Doubled. List. Lep. Brit. Mus. Pt. I. p. 19. (1844)
Diurnal Lepidoptera, I. p. 21. n. 263. (1847).
G. R. Gray, Cat. Lep. Br. Mus. Pt. I. p. 71. n. 330. (1852).
" List. Lep. Br. Mus. Pt. I. p. 84. (1856).
Cat. Lep. Mus. E. I. Co., I. p. 91. n. 187. (1857).
Clytia dissimilis. Swainson. Zool. Ill. 2d series, t. 120. (1832—1833).

Male.—Wings. Upper surface black, marked with a number of white rays and spots, separated chiefly into two transverse rows, of which the inner is composed of long rays, and the outer, much less in length, of lunulate spots and dashes; the cell also has white lines radiating from the base, and three rounded white spots near its extremity.

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* Capt. T. Hutton, Trans. Ent. Soc. V. p. 47.

Fore wings sinuate, with small white spots upon the positions of the obsolete indentations. Hind wings, dentate, deeply so, in some specimens; indentations, white, sometimes deep yellow, more particularly at the outer and anal angles; a fulvous-yellow lune at the anal angle; all the white parts are more or less sprinkled with fine black atoms; expanse 4—4½ inches.

Under surface very similar to the upper, but the white area is much enlarged, and the small indentations of the posterior wings expand into a marginal row of large yellow lunules, edged on the margin with a narrow white line.

Body blackish, with the head, palpi, breast and thorax spotted with white, abdomen striped with whitish lateral rays.

Hab.—Philippines, Java. (In my collection.)
China, Bengal, Nepaul. (Coll. Boisd.)
Northern India, Canara. (Coll. Mus. E. I. Co.)
N. India, Ceylon, Australia, Hong Kong. (Coll. Brit. Mus.)

The Javanese ♂ is larger, and the sub-marginal lunules, are thrown back much further from the outer margin than in the Philippine specimens. On the under surface, the chief difference is the conversion of the white lunules of the posterior wings into orange yellow, whilst those on the margin are very much larger; the hind wings are also very strongly dentate.

Var. *a. Pap. dissimilis* ♂. G. R. Gray, Cat. Lep. Br. Mus. Pt. I. p. 72. n. 330. (1852.)
Cat. Lep. Mus. E. I. Co. I. p. 92. n. 187. (1857).
Pap. Echidna. De Haan, Verh. Naturl. Gesch. p. 42. t. 8. f. 6. (1839).
Boisd. Sp. Gén. I. p. 378. n. 224. (1836).

Differs from the normal type in having the longitudinal rays a little shorter, and the lunules on the under surface of the secondaries, together with the anal spots, and the indentations, white.

Hab.—Timor. (Coll. Boisd.)

♀ *Pap. dissimilis.*
Pap. Panope. Linn. Syst. Nat. II. p. 782. n. 195. (1767).
Cram. III. t. 295. f. E. F. (1780).
Fab. Ent. Syst. III. i. p. 59. (1793).
Godt. Encyc. IX. p. 75. n. 142. (1819).
Boisd., Sp. Gén. I. p. 373. n. 218. (1836).
Kollar, in Hügel's Kaschmir. Pt. II. p. 406. (1842).
E. Doubled., List. Lep. Brit. Mus. Pt. I. p. 19. (1844).

Princeps Dominans Panope. Hübn., Samml. Exot. Schmett. I. t. 132. (1806
—1824).
Arisbe Panope. Hübn., Verz. bek. Schmett. p. 89. (1816).
Pap. Panopes. Godt., Encyc. IX. p. 75. n. 142. (1819).
Pap. Clytia. Linn. Syst. Nat. II. p. 781. n. 189. (1767).
Fabr. Ent. Syst. III. i. p. 127. n. 387. (1793).

Female.—Upper surface brownish-black, lighter towards the outer margin. Anterior wings present a sub-marginal row of lunulate white spots; that one at the apex, however. is a large oblong dash; the place of the indentations marked with small white spots.

Posterior wings have two rows of white marks; the inner sagittate and indistinct, the outer white and lunate, excepting the anal spot, which is bright orange-yellow; indentations same as in the male; expanse 4.25 inches.

Below, rich chocolate-brown; white spots on the fore and hind wings are more brilliant; and in addition to the two rows of white marks on the hind wings, there is a marginal row of yellow spots, as in the male, above the indentations.

Body as in the male.

Hab.—The same as the male.

Var. *a. Pap. dissimilis* ♀ Moore, Cat. Lep. Mus. E. I. Co., I. p. 92. n. 187. (1857).

"Anterior wings wholly brown."

Hab.———? (Coll. E. I. Co.)

Var. *β.* ♀ *Pap. dissimilis.* G. R. Gray, Cat. Lep. Br. Mus. Pt. I. p. 72. n. 330. (1852).
" List. Lep. Br. Mus. Pt. I. p. 84. (1856).
Cat. Lep. Mus. E. I. Co., I. p. 92. n. 187. (1857).
Pap. Palephates. Westw., Arc. Ent. p. 127. t. 79. f. 1. (1845).
E. Doubled., Cat. Lep. Brit. Mus. Pt. I. p. 19. (1844).
Diurnal Lepidopt., I. p. 21. n. 265. (1847).

"Closely allied to *P. Panope*, Linn., of which it will probably prove only a geographical variety, differing from the typical Continental individuals in the large pale patch near the tip of the fore wings, and in the hind wings beneath, having the veins margined with pale buff. In the disposition of the markings it otherwise accords with *P. Panope*, but its fore wings are more ovate, the apical margin being a little rounded; they are of a rich brown color, with a large whitish patch, formed of three confluent oblong spots near the apex of the wing, followed by a single small oval spot close to the apex; and beneath these are several small conical spots, which become united with the marginal spots, of which there are only six, the apical portion of the wing not possessing them; besides these there are three oval or round spots preceding them, towards the anal angle. The hind wings are brown, with five cuneated pale patches extending from the anal margin, succeeded by six lunate pale spots extending from the outer angle, and with five fulvous incisural spots, the anal angle bearing a larger oval fulvous spot, in which is a black dot. The fore wings on the under side are of a paler brown color, but similarly marked beyond the middle; the base also with several pale dashes. The hind wings have the veins from the base to beyond the middle edged with pale buff; half way between the discoidal cell and the hind margin of the wing is a row of five white crescents, shaded off into the ground color of the wing, and separated by brown arches from a row of white horse-shoe marks, within which are six large fulvous incisural marks; the base of all the wings with small round white spots; the body and abdomen are also spotted with black."—*Westwood.*

Hab —Philippines, (In my collection.)
"Manilla, (Mus. Nat. Paris.)" Westwood.

"Occurs in warm glens, as well as in the Dhoon, but it does not appear to be very numerous"—*Hutton.*

This species is very common in the Philippines.

Larva. Cat. Lep. Mus. E. I. Co., t. II. f. 3. 3*a*. (1857).

Cylindrical, fleshy and smooth on the surface; bluish; from the second to the sixth segment, inclusive, each ring is furnished with a double pair of lateral spines, short, black, and curved backwards; beyond this, a simple lateral spine; three yellow bands on the anterior portion, confluent at the head and seventh segment, whence the united dorsal band extends to the end of the ninth segment; two sub-dorsal bands on the three following rings, disconnected from the dorsal, and terminating on the anal segment in two round yellow dots, separated from the band by a narrow black line. Surface spotted with black, and marked with red tubercles; length about three inches.

Chrysalis straight, cylindrico-conical; brown, wing covers and head drab; head truncate and indented.

This description was taken from the figures mentioned above, which were copied from the drawings of General Hardwicke, now deposited in the Library of the British Museum.

"This species has been also reared in Ceylon by E. L. Layard, Esq. Its transformations were observed by Mrs. Hamilton in Moulmein. They were also observed by Lady Gilbert, among whose drawings figures are given. Her ladyship states that 'it feeds on a plant called by the natives *Maike.* The larva was obtained on the 26th of July; two days after it commenced its transformation, and on the following day the chrysalis resembled a dried twig, adhering to the frame only by the extremity of the tail, and supported on each side by two fine threads; in this state it died.'"*

LEPTOCIRCUS, Swainson.

29. **Leptocircus Meges,** Zinken-Sommer. sp.

Pap. Meges. Zinken-Sommer. Nova Acta Acad. Cur. Nat. XV. p. 161. (1831).
Leptocircus Meges. E. Doubled., Zoologist. III. p. 23. fig. (1843).
" List. Lep. Brit. Mus. Pt. I. p. 20. (1844).
Diurnal Lepidopt., I. p. 23. n. 2. (1847).
G. R. Gray, Cat. Lep. Br. Mus. Pt. I. p. 73. n. 337. (1852)
" List. Lep. Brit. Mus. Pt. I. p. 86. (1856).
Cat. Lep. Mus. E. I. Co., I. p. 85. n. 173. (1857).
Erycina Curius. Godt. Encyc. IX. p. 827. n. (1819).
Iphiclides Curius. Hübner Zuträge. f. 645–6. (1818).
Leptocircus Curius. Swains. Zool. Ill. 2nd series, t. 106. (1832–33).
Boisd., Sp. Gén. I. p. 381. t. 3. B. f. 1, t. 1. C. f. 3. (1836).

Upper surface, wings black, traversed between the base and middle by a common green band, and suddenly contracting on the disc of the secondaries, where it terminates in a white streak; apical half of primaries hyaline, edged by a narrow black border and crossed by black veins; tail very long, recurved at the extremity, and bordered externally with white; expanse 1.75 inches.

Below, the band changes to a greenish-white on the fore wings; nacreous on the hind wings, which are marked on the abdominal margin by three curved white streaks, chevron-shaped. Base of wings also whitish.

Body black; a green sub-dorsal line on the thorax; white below, with a lateral and sub-lateral row of black dots.

Antennæ black, under part of club, reddish.

Hab.—Philippines, (In my collection.)
Northern India, (Coll. Brit. Mus.)
Java, Siam, (Coll. Boisd.)
Java, (Coll. E. I. Co.)

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* Cat. Lep. Mus. E. I. Co. I. p. 92. (1857).

My single specimen (♂) is in such poor condition that I am still doubtful whether it should be placed under this title, or that of *Curius*. I located it temporarily under this species, though the other would have answered equally as well, for the purpose of contrasting it with the following new and very distinct species. It may perhaps be *L. Corion*, Gray, of which, however, I have seen neither figure nor description.

30. **Leptocircus Wilsonii,** nov. sp.

Upper surface black; abdominal margin of posterior wings chocolate-brown, fringed with long hairs; apical half of fore wings hyaline, and bordered as in *Meges;* common pale green band on the wings, terminating on the disc of the secondaries in a white streak as in *Meges;* but that part on the primaries is, in the *male*, simply a narrow pale green line; in the *female*, it is half the width of the band on the posterior wings; the lower half of which, together with the tail, is irrorated with brilliant white atoms; this last, which is not recurved at its extremity, and the indentations above it, are bordered with white, as in *Meges*. Expanse 1.50 inches, ♂; 1.62 inches, ♀.

Under surface, the common band is shining, pearly white on both wings; base greenish-white. In the *male*, a white lunule on the anal margin, followed by a small dot, and an oblong dash of the same color; in the *female*, the white lune is followed by two small dots, the last situated anteriorly.

Body black, with two lateral white lines on each side of the abdomen; palpi whitish; antennæ black, club white at the tip; claws bifid.

Hab.—Philippines, (In my collection.)

I have dedicated this pretty little species to Dr. Thos. B. Wilson, of Philadelphia.

This genus is certainly well represented, and considering its comparative rarity, appears to be quite common in the Philippines. It is with regret that I cannot give a diagnosis of the larva, as it would enable us to determine with certainty its position, at present very anomalous, in the family *Papilionidæ*.

EURYCUS, Boisd.

31. **Eurycus Cressida.** Fabr. Sp.

♂. *Papilio Cressida.* Fab. Ent. Syst. III. i. p. 20. n. 62. (1793)
Donovan, Ins. New. Holl. p. 12. f. 2. (1805).
Godt. Encyc. IX. p. 76. n. 145. (1819).

Nestorides Cressida. Hübn., Zutr. t. 841, 842. (1818).
Cressida Heliconides. Swains. Zool. Ill. 2nd ser. t. 94. (1832).
♀. *Papilio Harmonia.* Fabr. Ent. Syst. III. i. p. 20. n. 63. (1793).
Donov., Ins. of N. Holl. Pl. 12. f. 1. (1805).
Papilio Harmonides. Godt. Encyc. IX. p. 76. n. 146. (1819).
Eurycus Harmonia. Boisd. Sp. Gén. I. p. 393. n. 2. (1836).
♂ ♀ *Eurycus Cressida.* Boisd. Sp. Gén. I. p. 393. n. 1, 2. (1836).
E. Doubled., Cat. Lep. Brit. Mus. Pt. I. p. (1844).
Diurnal Lepidopt., I. p. 24. n. 1. (1847).
G. R. Gray, Cat. Lep. Brit. Mus. Pt. I. p. 73. n. 338. (1852).
" List. Lep. Brit. Mus. Pt. I. p. 86. (1856).

Male.—Upper surface: fore wings, oblong, diaphanous; the base. and two rounded areolar transverse spots, black, the costal and exterior borders, blackish. Inferior wings slightly dentate, black; a white central band, deeply dentate, especially on the exterior border, divided into a number of spots by the black veins; disco-cellular nervules, marked by a black lunule; a sub-marginal row of five vermillion-red round spots, all nearly or quite obsolete, with the exception of that one, nearest the angle, which is always very distinct; indentations narrowly edged with white; expanse 3.86 inches.

Under surface, fore wings as above; hind wings not so black as above; the red spots are all very distinct, and on the margin five large whitish spots, placed upon the indentations.

Body black, with the anus, two spots on each side of the thorax, and the sides of the pro-thorax red; palpi, white.

Female.—" A little less than the male. Superior wings oblong, semi-transparent, yellowish-white; costa and apex, brownish, and a small deep black spot at the extremity of the discoidal cellule. Inferior wings slightly dentate, or the same color as the primaries, with a broad brownish border, containing a row of five yellowish white spots, very small, and rounded; indentations of a yellowish-white.

" Under surface similar to the upper.

" Body, black; anus red, and prothorax spotted with white."—*Boisd.*

Hab.—Australia. ♂. (In my Collection.)
Australia. ♂. (Coll. Boisd.)
Australia. ♂ ♀. (Coll. Brit. Mus.)
" Van Dieman's Land." Swainson.

SERICINUS.

32. Sericinus Montela, Gray.

♂ *Sericinus Montela.* G. R. Gray, Proc. Zool. Soc. p. 71. (1852).
" Cat. Lep. Brit. Mus. Pt. I. p. 78 n. 361. t. XIII. f. 1, 2. (1852).
" List. Lep. Brit. Mus. Pt. I. p. 93. (1856).
Sericinus Telemon. Diurnal Lepidopt. p. 530. Suppl. Pl. f. 1. (1852).

Male.—Upper surface, yellowish-white. Primary wings have a large sub-triangular black spot at the base, which is divided into three spots by the nervures; a large black sub-costal patch in the middle of the cell; two interrupted transverse lines, on the disc; a marginal black band, obsolete, towards the inner angle; costa faintly lined with black, and some black atoms near the apex.

Hind wings have a broad areolar transverse black band; a broad band obliquely across the costal area; and a large black anal patch, extending inwardly as far as the discal nervure, and being connected with the costal band, by a narrow black line; this anal patch contains anteriorly, a crimson band, posterior to which there are two lunes, composed of blue atoms; head and thorax black, with a red collar; abdomen yellow, having a black dorsal band, a lateral row of large black dots, and some ventral longitudinal rays; tail long, linear, yellow at base and extremity, and black in the middle; expanse of wing 3.13 inches; length from head to tip of tail 2.5 inches.

Below the only perceptible difference, though, as usual the markings are much paler, is in the presence of a red spot, in the black costal patch of the posterior wings.

Hab.—China. (In my collection.)
Northern China. (Coll. Brit. Mus.)

"This species was brought by Mr. Fortune, who says that they are found in the valleys among the hills."—*G. R. Gray.*

Gray's figures differ somewhat from the specimens. Expanse ♂, 2.75 inches—3.10 inches. Markings vary in size and number, the largest being the darkest, and also having the crimson band much brighter. In my ♂, there is an indistinct black lune, near the inner angle of the anterior wings, observable in neither of his figures; also, the blue marks on the posterior wings are distinctly lunate, instead of being dots, as he represents.

♀ ***Sericinus Fortunei***, G. R. Gray, Proc. Zool. Soc. p. 72. (1852).
" Cat. Lep. Brit. Mus. Pt. I. p. 79. n. 363. t. XIII. f. 5. (1852).
" List. Lep. Brit. Mus. Pt. I. p. 93. (1856).
Sericinus fasciatus. Brem. & Grey. Beitr. Schm. des Noerd. China. p. 5. (1853).

Female.—" The primary wings yellowish-white, with many irregular black spots which vary in size, some of them are so placed that they apparently form five bands across the wing, and the exterior margin is also black. The secondary wings are also yellowish white, with a basal band and three irregular curved bands of black spots; the second band from the base is broadest at the anterior angle, and marked with a small crimson spot; while that portion towards the anal angle is margined exteriorly by an irregular crimson band, which extends from the angle to the second sub-costal nervule; the third or marginal band is ornamented on the deep black below the crimson by a series of pale blue lunes. The caudal appendages are slender, of about one inch in length, the base and apex yellowish-white, with the intermediate part black.

" The under surface of all the wings is less prominently marked; otherwise they are similar to the upper side; except that on the primary wings there are two crimson spots, one on the band near the costal area, and the other on the posterior margin.

" The specimens brought by Mr. Fortune were found on the sides of the hills."—*G. R. Gray.*

Expanse 2.87 inches.

Hab.—China. (In my collection.)
Northern China. (Coll. Brit. Mus.)

There is certainly great incongruity between Mr. Gray's description and his figure representative of the same sex. Neither are wholly correct, in comparison with the specimen in my possession. In the figure, there is but one blue lune on the posterior wings, instead of " a series," whilst in mine there are three. The caudal appendages, in the figure, are not very slender, and by no means an inch in length, as stated in the description, but only about .63 inch, neither is it at all yellow at the tip. In my specimen they are .93 inch in length, otherwise agreeing with his description.

Below, there is not the slightest vestige of red spots upon the anterior wings, and there are two red spots on the costal margin, instead of being "similar to the upper side."

I have described a species below, which, if it does not prove to be distinct from this, is at least a remarkable variation from either Mr. Gray's figure or description. I have named it after my friend, Mr. E. T. Cresson, of Philadelphia:—

33. **Sericinus Cressonii,** nov. sp.

Female.—Differs from *Sericinus Fortunei* (*Montela.* ♀) in the following particulars:—

Fore wings, have the fifth transverse black band connected with the margin by dilated black nervules, forming a sub-marginal row of small yellow lunes.

Hind wings, have the crimson band wider, and the two last sections are lunate, and separated from each other, and the remainder of the band by intervening black lines, below this, four pale blue lunes: a very large yellow patch on the costal margin near the outer angle; a large lune of the same color, situated on the angle: tail, yellow at base and tip, intermediate portion black, very long, 1.25 inches and narrower than in any other species of the genus; expanse 3.13 inches.

Below; the primaries have four red spots, two just beyond the extremity of the discoidal cell, and the others on the inner margin. Secondaries, have two red spots on the costal border, and the space posterior to the crimson band is irrorated with blue atoms, not formed into distinct figures but covering the whole surface.

Thorax and head, black, a yellow line on each side of the thorax, below yellow, with red spots. Abdomen yellow, a broad dorsal band, two rows of lateral dots, and two ventral rays, all black.

Hab.—China. (In my collection.)

Eggs, extracted from the body, resemble a flattened spheroid, greatest diameter, .042 inch, least, .025 inch, white, with a double black ring around the middle, parallel with the direction of compression.

I have now finished the family *Papilionidæ* as far as possible in relation to my own collection, but before closing this paper, I desire to present a few remarks of Thos. Horsfield, Esq., treating of what may be emphatically called the natural system of classification, in which the natural history of the whole insect is considered, from the ovum to the imago, in contradistinction to the artificial, which considers only the characters of the perfect insect.

I have here followed the latter, not because I think it is most correct, but simply because, like all artificial systems, it is much the most convenient for reference, and for the more important reason that I was totally unacquainted with the metamorphoses of these exotic butterflies, which play such a prominent part in the formation of the natural system, but was entirely dependent upon the statements and figures of others, which, however correct, can never be so fully relied upon as personal observation.

Without proceeding too extensively into the elaboration of Dr. Horsfield's views, who distributes the butterflies with especial reference to the characters of the insect in all its stages, we find that the following points form the basis of his system:

"First. That the series of affinities in groups of the Animal Kingdom is progressive, and that it returns into itself; and thus the groups form circles."

"Secondly. That the primary groups of those departments of the Animal Kingdom, which have hitherto been investigated, have been ascertained to be limited to five."

"Thirdly. That each group in a circle is analogically represented by the corresponding group in the other circles."

These are the essential considerations; he also enumerates several others, but which are subordinate to these.

According to the second law, "the whole Animal Kingdom has been divided into quinary groups, which are again subdivided into groups of consecutively descending value; thus the Animal Kingdom is divided in descending order into Sub-Kingdom, Class, Order, Tribe and Stirps."

With reference to Tribe I. *Papiliones*, of the Order Lepidoptera—the one with which we are immediately connected—upon the axiom, "that in groups of consecutive minor value, the same principles are found to prevail," he has divided it into five stirpes, each supposed to be connected with the two adjoining, and the terminal to be, in like manner, allied to the first, so as to form a circle. These have been named according to the form of the larva, from their resemblance to the five typical groups of the *Ametabola*.

First Stirps, Vermiform.
Second " Juliform *or* Chilognathiform.
Third " Scolopendriform *or* Chilopodiform.
Fourth " Thysanuriform.
Fifth " Anopluriform.

To prevent any misapprehension of the application of these terms, Mr. Macleay says (H. E. p. 423.): "The distinction, however, between affinity and analogy, is perhaps nowhere in Entomology more necessary to be attended to than here; since, in terming larvæ, *Chilognathiformes* or *Chilopodiformes*, it is not meant that they are *Scolopendræ*, or *Juli*, or even near to them in affinity, but only that they are so constructed that certain analogical circumstances attending them strongly remind us of these *Ametabola*."

In the second stirps, the typical division of which (the family *Papilionidæ* of Leach,) we have just completed, the following characteristics are especially prominent:

"*Larva* of a cylindrical form, generally swelled or thickened at the fourth or fifth section of the body, attenuated towards the head and posterior extremity; in the typical genera naked, or covered with short, obtuse, fleshy protuberances; in the extreme genera at the boundary of the neighboring groups, covered with a close silky down, or with short scattered hairs, most remarkably distinguished by a furcula or forked tentaculum, situated between the head and neck, which may be drawn back or thrust forward at pleasure."

"*Pupa*, angulated and mostly tuberculated; in the typical genera, and in those at the confines of the first group, attached by the posterior extremity, braced and vertically suspended with the head upwards; in the genera approaching the third stirps, perpendicularly suspended, according to the habits of that stirps. Representing the *Chilognathiform* or *Juliform Ametabola*."

The genus *Papilio* (including *Ornithoptera* and *Atrophaneura*,) is at present very unwieldy; species are associated, which, except in their nervular arrangement, have but little generic relation with each other, yet sufficient to unite them under this system, provided that they were also agreed in their preparatory stages; but, according to the third law, cited above, we should naturally expect analogical divisions in the genus, corresponding with those of the tribe, and such, indeed, appears to be the fact, so far as incomplete and sectional investigation will verify it. The Eastern Lepidoptera, as examined by Dr. Horsfield, furnish three sub-typical divisions, all well marked by differences in the antennæ and metamorphoses, and probably in the neuration, but this will require further investigation.

Thus, then, a division or genus of the stirps having Chilognathiform larvæ, contains within itself species, which, though the larva be Juliform, present a certain analogical affinity to the larva of the other four stirpes, while in each of these separate groups the imago manifests a character which reciprocally confirms the distinct character of these divisions.

We have already discovered the resembling forms of the third and fourth stirpes; perhaps, in collections of greater extent and from more extensive regions, the Vermiform and Anopluriform representatives may be found, and it would not be strange if one or both would be represented by American types. It would be interesting to determine whether this sub-representation of all the stirpes took place in each stirps, and also in its several genera, and, imperfectly, of course, in the species composing these genera. This subject I will discuss more fully in a future paper.

These analogical divisions form then, very natural sub-genera, into which the present genus Papilio (*Papilio*, *Ornithoptera*, *Atrophaneura*) may be appropriately divided.

The sub-generic characters are:—

" *First.* Antennæ, filiform at the base, marked along their entire length, with prominent annular rings, and terminated by a cylindrical club, which is attenuated at both ends."

" The larva of this division is characterized by a smooth surface, and by a swelling or intumescence of the fourth or fifth segment of the body, from which it tapers more abruptly to the head, and in a gradual manner to the anal extremity."

This division is exemplified by

Pap. Memnon.
" Emalthion.
" Alcinous.
" Polymnester.
" Helenus.
" Iswara.
" Varasi.

Pap. Polytes.
" Pammon.
" Demolion.
" Erithonius.
" Demoleus.
" Arjuna.
" Xuthus.

Pap. Machaon.
" Turnus.
" Troilus.
" Asterias.
" Thoas.
" Cresphontes.

and also by their metamorphoses, as far as known.

To this division, as it is typical not only of the genus, but also of the whole stirps, and exhibits the most perfect production of the order, *Lepidoptera*, I would reserve the Linnæan name *Papilio*.

" *Secondly*. The antennæ agree in form and outline with those of the first, but the annuli, or rings, along their entire length, are comparatively obscure."

" The larva is cylindrical, very slightly attenuated at the ends, somewhat thick and fleshy, smooth on the surface and provided with short obtuse tubercles along its entire length."

This is the Chilopodiform modification of the genus Papilio, and to which I have assigned the name of *Pachliopta*.

It is represented by the following species:—

Ornithop. Darsius.
" Pompeus.
" Rhadamanthus.
" Priamus.
Pap. dissimilis.

Pap. Hector.
" Diphilus.
" Philenor?
" Polydamus?

"*Thirdly*. The antennæ are slender, filiform at the base, but terminated by an oval, comparatively enlarged, compressed club, on which the annuli are closely arranged and crowded."

"The larva is smooth, slightly attenuated towards the extremities, somewhat broader or arched in the middle, and marked with regular transverse bands; but its chief character consists in two projecting points from the abdomen."

It is exemplified by the following species:—

Pap. Sarpedon.
" Agamemnon.
" Eurypylus.
" Antiphates.

Pap. Marcellus.
" Ajax.
" Podalirius?
" Sinon.

These form the Thysanuriform division of the genus Papilio, and which I have called *Pathysa*.

The names which I have here proposed are not arbitrary, but have been derived from the union of the first syllable of the generic name, with those commencing the analogical name of the larval form: to complete the series in all its forms, we should then call the first subgenus, as yet unknown, *Pavermia*, and the fifth, *Panopluia*.

A tabular arrangement would present the following form :—

Genus.	Form of Larva.	Typical Species.	Sub-Genera.	
PAPILIO.	1. Vermiform.	Unknown.	**Pavermia.**	I have been unable to find any larval form corresponding to this stirps, so that the name is hypothetical, and dependent upon the future discovery of such a form. That such exists, may be reasoned from the existence of the three other types.
	2. Juliform *or* Chilognathiform.	Pap. *Memnon.* Pap. *Machaon.* Pap. *Thoas.* Pap. *Turnus.*	**Papilio.**	Typical of the whole stirps, and the most perfect form of the order.
	3. Scolopendriform *or* Chilopodiform.	Orn. *Pompeus.* Orn. *Rhadamanthus.* Pap. *dissimilis.* Pap. *Philenor?*	**Pachliopta.**	Name indicative of analogical resemblance to the larval form of the third stirps.
	4. Thysanuriform.	Pap. *Agamemnon.* Pap. *Eurypylus.* Pap. *Antiphates.* Pap. *Marcellus.*	**Pathysa.**	Shows the analogical resemblance to the larval form of the fourth stirps.
	5. Anopluriform.	Unknown.	**Panopluia.**	Name hypothetical, but created in the belief that the same principle prevails in regard to the fifth stirps as that which we already know exists in relation to the second, third and fourth stirpes.

The truth of this analogical arrangement will be proven, as we become better acquainted with the preparatory stages of the insects; and, to further this purpose, I would suggest to all, the great importance and necessity of making the larval form a subject of equal magnitude with the imago; and thus by patient study and attention we may finally be enabled to realize a truly natural system of this most beautiful division of the Animal Kingdom.

NORTH AMERICAN MICRO-LEPIDOPTERA.

BY BRACKENRIDGE CLEMENS, M. D.

BRENTHIA Clemens.

Proc. Acad. Nat. Sci. of Phila., May 1860, p. 172.

Brenthia Virginiella n. s.—Fore wings dark brown, tinged with ochreous between the markings toward the tip, with an oblique, somewhat violet-hued silvery line, from the costa at the apical third, directed toward the anal angle: a line of the same hue from the tip of the wing, parallel to the hinder margin, and a white costal streak equidistant from the two silvery lines. On the inner margin, a little interior to the anal angle, is a silvery, somewhat violet-hued spot. Cilia whitish beneath the tip of the wing, with a dark intercilial line. Hind wings dark brownish, with a silvery spot near the hinder margin above the anal angle.

A single specimen. Virginia. Coll. Ent. Soc. Phila.

GRACILARIA Zeller.

Proc. Ent. Soc. Phila., March 1863, p. 9.

Gracilaria Blandella n. s.—Fore wings yellow, dark purple along the dorsal margin from near the base to the tip of the wing. Near the tip is a projection from the dorsal stripe extended to the costa, and a little interior to the middle of the wing, the dorsal stripe is excavated, and presents a blunt projection toward the costa. Near the base is a broad, dark purple band from the costa, which forms the interior limit of the excavation. The costa, from the band to the base of the wing, and the base of the inner margin, is dark purplish. Extreme base of the wing, yellow. Cilia purplish, with an intercilial paler line. Hind wings and cilia, pale fuscous.

Face yellowish; head above tinted with purplish. Antennæ yellowish, annulated with purplish. Labial palpi yellowish, with a brownish spot on the end of the middle joint and the tip of the terminal joint brownish.

A single specimen. Virginia. Coll. Ent. Soc. Phila.

TINEA.

Proc. Acad. Nat. Sci. Phila., Sept. 1859, p. 257.

Tinea tapetzella Lin.—Fore wings blackish at the base, extended further along the costa than the inner margin; the remainder of the wing is yellowish-white. The whitish portion of the wing is marked with numerous, interrupted transverse blackish striæ and at the base of the nervules, in the middle of the wing, is a blackish spot and two or three small ones at the apex of the wing. Cilia whitish, at extreme apex fuscous. Hind wings dark grey, with paler cilia.

Head and face white. Palpi white; second joint externally dark fuscous. Antennæ fuscous.

This is an European insect, and does not differ from the descriptions and figures of European authors. I have never before, however, met with a specimen of it and do not know the circumstances of its capture.

A single specimen. Virginia. Coll. Ent. Soc. Phila.

COLEOPHORA Zeller.

Proc. Ent. Soc. Phila., March 1863, p. 6.

Coleophora cratipennella n. s.—Fore wings white, striped along the veins with dark ochreous. From the base of the wing are three stripes, one along the submedian, median and *a rather broad one between the costal and subcostal vein.* In the middle of the disk is another stripe, and about the middle of the wing. begins a stripe along the subcostal vein which subdivides into two branches. terminating on the costa; beneath these are two other stripes, one along the inner margin from the tip, the other in the middle of the wing. Cilia ochreous. Hind wings fuscous, cilia yellowish-fuscous.

Antennæ white, annulated with dark ochreous. Labial palpi white, dark ochreous along the sides.

A single specimen. Virginia. Coll. Ent. Soc. Phila.

GELECHIA.

Proc. Ent. Soc. Phila., March 1863, p. 10.

Gelechia gallægenitella, Proc. Ent. Soc. Phila., May 1864, p. 420.

Since the description of this insect was given, Mr. Benj. D. Walsh has forwarded to me another specimen, under the impression that it was a distinct species. The differences in ornamentation between the two, and another in the collection of the Entomological Society of Philadelphia, deserve critical notice.

The original description of *gallægintella* ought to be so modified as to read, instead of "Fore wings white, but so freely dusted with black as almost to obscure the ground color, especially between the bands": Fore wings black, freely dusted with white.

The following is a description of the specimen last received from Mr. Benj. D. Walsh, the larva of which mines the same gall as *fungivorella*, the cabbage-like gall, *brassicoides*, peculiar to *Salix longifolia.*

Fore wings dark gray, dusted with white. At the base of the wing is an oblique, blackish-brown band, which terminates on the fold in a little tuft of brown scales. The band is margined exteriorly with whitish, and the wing along the base of the inner margin is pale gray. The middle of the wing has a large dark brown shade, which is divided by a pale grayish, costal spot placed about the middle of the costa; in this shade is an oblique, blackish-brown band, which is parallel to the basal band and beneath it, in the middle of the wing are two small tufts of brown scales. At the base of the fold, is a black dot, and one just above its termination, the latter encircled with white. The apical portion of the wing is somewhat dotted and streaked with whitish and at the base of the costal cilia are a few blackish dots. Cilia grayish fuscous. Hind wings grayish; cilia grayish fuscous.

A single specimen from Mr. Benj. D. Walsh, Rock Island.

The following specimen differs somewhat in distinctness of ornamentation of the fore wings from the typical one in my possession, but I attribute this to the fact, that it is not in so good a state of preservation.

The fore wings are blackish-brown, without distinct markings, and dusted with yellowish-white. The inner margin along the base is whitish; cilia, pale ochreous-gray. Hind wings pale grayish; cilia pale ochreous gray.

Antennæ annulated with blackish and white. Head whitish dusted with dark fuscous. Palpi, middle joint dark brown, white at the extreme tip; apical joint white, with two blackish-brown rings, one near the base, the other at the tip, leaving the extreme apex, white.

A single specimen. Virginia. Coll. Ent. Soc. Phila.

Gelechia nigratomella, Proc. Ent. Soc. Phila., March 1863, p. 11.

Differs from the previously described specimen in the general hue of the fore wings. The specimen under description has the fore wings ochreous, and whitish along the costa at the base. There are five blackish-brown costal spots beginning on the middle of the costa, with intermediate white costal spots, the second being an oblique white line. In the middle of the wing, at the apex, is a white spot, with a blackish-brown dot beneath it. At the base of the fold is a brownish dot and another about its middle.

A single specimen. Virginia. Coll. Ent. Soc. Phila.

Gelechia fungivorella n. s.—Fore wings roseate white, freely dusted with testaceous-brown, along the inner margin from the base to the tip of the wing, the costal half of the wing being banded with alternate roseate-white dusted with brownish, and testaceous brown bands. Near the base of the wing is an oblique testaceous band extended a little beyond the middle of the wing, margined externally by a roseate white band having a central line of brownish atoms. Another testaceous band placed about the basal third of the costa, is oblique, extends a little beyond the middle of the wing; its dorsal edge is convex and the costal edge concave; it is broadest in the middle of the wing and terminates in a point, just beneath which is a black or dark brown dot encircled with white or roseate white. Towards the apex of the wing is a semicircular. testaceous, costal patch, margined with white or roseate white. The apical portion of the wing is dusted freely with testaceous, and at the base of the cilia, near the anal angle are one or two black dots. Cilia testaceous, with a white patch beneath the tip having a central dark brownish cilial line, and a white or roseate white patch at the anal angle.

Antennæ dark brown, slightly annulated with shining white. Head whitish. tinted with fuscous. Labial palpi white; second joint with three blackish rings, one at the base, one in the middle and one near the tip; terminal joint with four blackish rings, one at base, two in the middle and one at the extreme tip.

My friend Mr. Benj. D. Walsh, of Rock Island, Illinois, writes to me that "the larva mines a cabbage-like gall, *brassicoides*, peculiar to *Salix longifolia*, and a pine-cone-like gall on *Salix cordata* named *strobiloides* by Osten Sacken." The ornamentation of the imago is similar to that of *G. roseosuffusella* the larva of which inhabits the fruit-panicles of Sumach. Imago occurs August 1st, 15th.

Bred by Mr. B. D. Walsh, Rock Island, Ill.

Gelechia Salicifungiella n. s.—Fore wings red, irregularly marked with whitish. Near the base is a whitish band powdered with dark fuscous, which curves across the fold, including the inner margin, and reaches the middle of the wing; the part beneath the fold is tinged with reddish and sometimes with pale brownish. Adjoining this band exteriorly, is a dark brownish-red, curved band, which does not cross the fold. On the costa are three small white spots, one near the tip, one about the middle and one exterior to the brownish-red band. The margin of the wing is powdered with dark fuscous. Cilia red. Hind wings dark gray, cilia grayish fuscous.

Head reddish. Antennæ black, annulated with white. Labial palpi pale red: second joint with two blackish rings; terminal joint with three black rings and a black dot at base, extreme tip black.

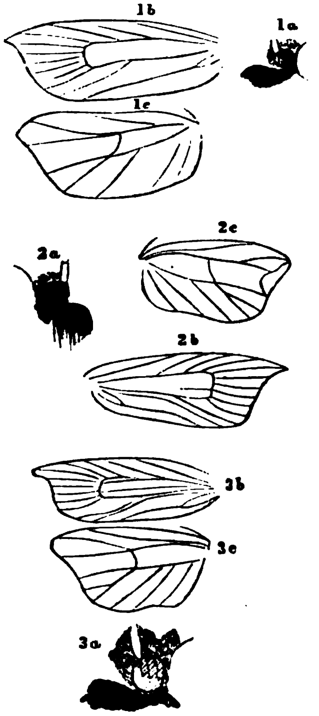
The larva mines the same gall, *brassicoides*, as *G. fungivorella*. Mr. Walsh bred six specimens, of which he was kind enough to send me three. Although *fungivorella* is tinged with roseate in the white markings, I can perceive no tendency in the eight specimens of this imago, that Mr. Walsh has so liberally sent me, to merge into the ornamentation of *Salicifungiella*. Certainly the character of the markings is the same in each, and it is possible that we have here but a single species. The imago occurs August 3d—13th.

Bred by Mr. B. D. Walsh.

TORTRICIDÆ.

ANCHYLOPERA Stephens.

Proc. Acad. Nat. Sci. Phila., Aug. 1860, p. 348.



1a Head of *A. nubeculana.* 1b Fore wing, 1c Hind wing—2a Head of *A. ocellana.* 2b Fore wing, 2c Hind wing —3a Head of *A. mediofasciana.* 3b Fore wing. 3c Hind wing.

The palpi of *A. ocellana* have been partially denuded by mites.

This genus can be divided into very well marked groups. The first group, of which *A. Spireæfoliana* may be taken as the type, has the median vein of the hind wings 3-branched and the apex of the fore wings acutely produced.

The second group of which *A. ocellana* may be taken as the type, has the median vein of the hind wings 4-branched, the two central branches arising from a common stalk, and the apex of the fore wings acutely produced as in the first group.

The third group is represented by *A. costomaculana*, in which the apex of the fore wings is not acutely produced, but the hinder margin is falcate and the tip sometimes bluntly produced. The median vein of the hind wings is 4-branched, the central branch being furcate. The disk of the fore wings has a secondary cell and a false nervure running through it from one of the branches of the median vein. The structural illustrations which accompany this paper will serve to give a definite notion of these groups and facilitate their recognition.

The members of the genus arranged in groups, will therefore stand thus:

GROUP I.

Hind wings with median vein 3-branched.

§ Tip of fore wings acutely produced.

A. Spireæfoliana, pulchellana, fuscociliana, dubiana, Lamiana, nubeculana, Platanana.

§§ Tip of fore wings not acutely produced.

A. striatana.

GROUP II.

Hind wings with median vein 4-branched.

§ Tip of fore wings acutely produced.

A. ocellana.

GROUP III.

Hind wings with median vein 4-branched.

§ Tip of fore wings not acute, sometimes bluntly produced.

A. costomaculana, Virginiana, mediofasciana, fasciolana, striatana, Packardiana.

A. striatana appears to be a connecting link between the groups, as the structure of its wings is by no means constant. In some specimens the median vein is 3-branched; in others 4-branched, the two central branches arising from a common stalk; and again it is 3-branched with the central branch furcate at the extreme tip. This is the first example I have ever noticed of variability of wing structure in a species. The species may be, so to speak, in a transition state and it would be interesting in the future to know which wing type it will ultimately assume. I have seven specimens before me, in one of which the median vein is simply 3-branched, in three others the central branch is furcate at the extreme tip and in three others it is furcate from the middle. Have we an instance of a forming species in this insect, or is this variation of structure accidental and of no significance?

Anchylopera ocellana n. s.—Fore wings brownish, with pure brown towards the tip. The costa is geminated with dark brown from the base to near the tip and thence with four or five white streaks. Beneath the tip, is a large, conspicuous ocelloid spot, which is white, somewhat varied with brownish and having a few dark central dots, sometimes indistinct. Cilia along the hinder margin white? Hind wings grayish.

The specimens before me are worn and imperfect and it is scarcely prudent to draw a description from them, but the species is markedly characterized by the white patch beneath the tip of the fore wings. The labial palpi are almost entirely denuded and appear to me not to correspond to those of the genus in which I have placed the species. I do not however entertain any doubt that the insect is improperly located. The fore wings are very acutely pointed and deeply excised beneath the tip. The neuration of the wings is normal. In the hind wings the costal and subcostal veins are free to the base. The branches of the subcostal are not connivent at their origin, but divergent. The discal arises much posterior to the bifurcation of the subcostal. Median vein 4-branched, the central branches on a common stalk.

I have two specimens received from Mr. A. S. Packard, Jr., collected at New Brunswick, Maine, and numbered by him 816.

Anchylopera mediofasciana n. s.—Fore wings dark brownish beneath the subcostal vein, white along the costa. From the middle of the costa arises an oblique dark brown band, which runs into the dark portion of the wing and encloses a semi-oval, white spot on the costa near the tip, having a few costal brown dots. The costa is dotted with blackish from the base to the tip of the wing and a few blackish dots are disposed over the surface of the wing. The ocelloid patch is white, and contains two round grayish brown spots. Hind wings pale brownish.

I have a single specimen before me received from Mr. A. S. Packard, Jr., in bad condition and numbered 804.

Anchylopera fasciolana n. s.—Fore wings shining white, with dark brown markings, having a slight golden hue. From the middle of the costa arises a rather broad, oblique dark brown band, with irregular edges. The costa is streaked with dark brown from the base to the tip. At the extreme tip is a brown dot and along the hinder margin an irregular streak of the same hue, which forms a squarish spot over the discal nervules. The ocelloid patch is white with central, wavy brownish line. The white portions of the wing is dotted with brownish. Hind wings grayish, brownish towards the outer angle.

I have a single specimen not in good condition. It is possible it may be a variety of *A. mediofasciana.*

From Mr. A. S. Packard, Jr., New Brunswick, Maine.

Anchylopera pulchellana n. s.—Fore wings ferruginous brown, varied with ochreous-white. The costa is ochreous-white from the base to the middle of the wing, and at this point a whitish fascia curves across the wing towards the anal angle, enclosing a semi-oval ferruginous-brown patch on the base of the inner margin. Above the anal angle is a whitish ocelloid patch, somewhat silvery, having in its middle a ferruginous brown spot and into which runs the curved whitish fascia. The costa from the base to the middle is dotted with blackish and thence to the tip are four or five white geminations with ferruginous brown centres, the one nearest the base of the wing extended into a very oblique line and bordered above with a slender blackish line. Beneath the tip in the cilia are two divergent white streaks. Hind wings rather pale fuscous.

A single specimen. From the Collection of the Entomological Society of Philadelphia, collected in Virginia.

It is possible this insect may be a variety of *A. Spiræfoliana*, but in the latter species the semi-oval dorsal patch at the base of the inner margin is almost blackish-brown, while in *pulchellana* it is ferruginous-brown, and the white portion of the fore wing of *Spireæfoliana* is more conspicuous than in *pulchellana*. The ornamentation of the exterior portion of the fore wings is much the same in both, except that the abbreviated central fascia is well marked in *Spireæfoliana* and the ocelloid patch has two or three short blackish-brown striæ.

Anchylopera fuscociliana n. s.—Fore wings ferruginous-brown, white along the costa at the base. The semi-oval dorsal patch at the base of the wing is dark brown, and is but indistinctly separated from the ferruginous portion of the wing, which is the external half. The apical half of the costa, from the middle to the tip of the wing, is occupied by a dark ferruginous, semi-oval patch, excavated near the tip by the ocelloid patch, which is rather indistinct and of an ochreous hue. The costal striæ near the tip are white, short and separated by dull leaden hued streaks, the most interior of which is extended very obliquely nearly to the hinder margin, beneath the tip, and just beneath it are two blackish striæ. Cilia reddish-brown. Hind wings dark-brown, cilia whitish.

From the Collection of the Entomological Society of Philadelphia, collected in Virginia.

Anchylopera dubiana n. s.—Fore wings white with ochreous-brown markings. The dorsal semi-oval patch is ochreous-brown and is not so abruptly curved on its exterior margin as in *Spireæfoliana* and *pulchellana*. The central fascia is ochreous-brown and distinct, and the costa exterior to it is striated alternately with white and ochreous-brown. This portion of the wing beneath the central fascia and the costal striæ are tinted with ochreous, and has two dark brown striæ. Hind wings pale fuscous.

This specimen is very like *Spireæfoliana* except in the hue of the semi-oval patch and the curvature of its outline. I very much doubt its distinctness specifically, and have so described it only after much hesitation.

A single specimen. From the collection of the Entomological Society of Philadelphia, collected in Virginia.

Anchylopera Virginiana n. s.—Fore wings gray, tinted with brownish, and marked with deep brown. The basal portion of the wing is dusted and striated with brown. The half of the costa from the middle to the tip contains a large dark patch, which extends to the fold of the wing in an obtuse point and is deeply excavated by the ocelloid patch; this is of the general hue and contains a transverse, slender, wavy line. Hind wings fuscous. Labial palpi, head and thorax fuscous.

In ornamentation this species is very like *A. costomaculana*, but the general hue in the latter is white, tinted with ochreous.

A single specimen. From the collection of the Entomological Society of Philadelphia, collected in Virginia.

Anchylopera Lamiana.—Fore wings brown, marked with whitish. From the base to the middle of the wing the costa is whitish, and from the middle of the wing the white stripe curves across to the inner margin; this transverse stripe is more or less varied with brownish, and the costa from the base to the middle of the wing is striped with dark brown. The dorsal patch is pure dark brown. The central fascia is very distinct and beyond the middle of the wing is enlarged into a triangular patch. *The ocelloid patch is very distinct, white, and contains a brown round patch at the anal angle.* The apical portion of the wing is brown and on the costa, from the central fascia to the tip of the wing, are four white geminations, separated by brown streaks; the white streak nearest the central fascia, is continued very obliquely to the hinder margin beneath the tip, where there is a white gemination in the cilia. Hind wings dark fuscous.

The ornamentation of this imago resembles strongly that of *Spirææfoliana* and *pulchellana*, but differs from both in the character of its marking.

Two specimens. From A. J. Packard, Jr., Brunswick, Maine.

HEDYA Hübner.

Proc. Acad. Nat. Sci. Phila., Aug. 1860, p. 357.

Hedya deludana n. s.—Fore wings gray, marked irregularly with blackish-brown patches and streaks, and leaving a rather indistinct gray patch on the middle of the inner margin. The costa is geminated with gray from the base to the tip of the wing, with intermediate blackish-brown streaks, and one of these near the tip is curved and extended to the middle of the hinder margin. The middle of the wing is clouded with blackish-brown and shows only a slight indication of the basal patch. The ocelloid patch is indicated by two slightly leaden hued streaks above the anal angle. Hind wings fuscous. Head and labial palpi, grayish freely dusted with dark brown.

In another specimen the markings of the fore wings were of a more pronounced blackish-brown, especially in the middle of the wing and the curved streak near the tip of the wing is somewhat obscured by a blackish-brown patch that adjoins it.

From the collection of the Entomological Society of Philadelphia, collected in Virginia.

Hedya spoliana n. s.—Fore wings dark gray slightly lustrous, varied with pure brown and dark brown. The basal patch is distinct, angulated and dark brown. The central fascia is dark brown, narrow on the costa, angulated in the middle and increases in width to the inner margin. Between the central fascia and the basal patch is a grayish patch on the inner margin, extended to the costa and divided above the middle of the wing by a dark brown line and somewhat varied with dark beneath the middle of the wing. The costa is distinctly geminated with a lustrous gray, from the basal patch to the tip of the wing, separated by dark brown streaks, which are *touched with dark brown*. The ocelloid patch consists of two leaden hued streaks, with a dark brown centre touched with brown, and a large patch of the same hue between it and the dorsal patch and a small one between it and the hinder margin. Cilia dark ochreous touched on the ends with dark brown. Hind wings shining, pale fuscous. Head and labial palpi dark grayish-brown.

From the collection of the Entomological Society of Philadelphia, collected in Virginia.

Hedya Cressoniana n. s.—Fore wings blackish-brown, the portion of the wing exterior to the basal patch freely dusted with gray. The basal patch is distinct, angulated and blackish-brown. The central fascia is angulated obtusely, narrow on the costa, widening as it approaches the inner margin and is blackish-brown. Between the basal patch and central fascia, is a gray dorsal patch extended to the costa, containing an indistinct blackish-brown line on the costal side. The ocelloid patch has two transverse leaden hued stripes and the apical portion of the wing above it has several small spots of the same hue. The costa, from the base to the tip of the wing, is white marked with blackish-brown streaks, of which that forming the central fascia is the most pronounced. Cilia grayish, tipped with dark brown. Hind wings fuscous. Head and palpi dark brownish.

From the collection of the Entomological Society of Philadelphia, collected in Virginia.

Hedya signatana n. s.—Fore wings white, marked with dark brown. The basal patch is distinct, dark brown and consists of three or four angulated lines, the exterior being the broadest. The dorsal patch is white, extended to the costa, contracted in the middle of the wing and is traversed by a few broken, indistinct, brownish lines. The central fascia is dark brown, rather indistinct, and contains three black dashes opposite the ocelloid patch, which is white and rather indistinct. The costa is marked with dark brown streaks and near the tip are three or four geminated white spots, the dark brown streak which separates the two nearest the tip of the wing is extended along the hinder margin to the ocelloid patch. At the extreme tip is a black semicircle in the cilia, upon a dark brown ground. Hind wings dark fuscous.

A single specimen. From the collection of the Entomological Society of Philadelphia, collected in Virginia.

Hedya salicicolana n. s.—Fore wings blackish-brown, with dark leaden markings lustrous and tinted with bluish. The basal patch has its posterior edge slightly rounded, scarcely angulated. The central fascia is oblique, nearly of equal breadth and is blackish-brown. Between the central fascia and the basal patch is a dark leaden band having a bluish, lustrous tinge, and the apical portion of the wing is of the same hue, varied with blackish. The ocelloid patch is not distinct and is marked by a few streaks of black and a small patch of brownish and white scales. The costa is slightly geminated with white from the basal patch to the tip of the wing, with intermediate blackish brown stripes, one of which is extended to the hinder margin beneath the tip. Hind wings dark fuscous.

Mr. B. D. Walsh, to whom I am indebted for a suite of specimens, says respecting its larval life, that "it mines a gall like a rose, on a dwarf upland willow, *Salix humilis*, which I call *salicis rhodoides*, and swarms in it, several being found in each gall. I have bred over a hundred, but, as is the case with the other specimens sent herewith, it varies but little, I send only a few." The larvæ are found from Aug. 1st to the 24th.

Hedya saliciana n. s.—Fore wings brown, slightly testaceous, marked with white clouded with brownish. The basal patch has its posterior edge strongly angulated. The central fascia is often illy marked, oblique and of the general hue. Between the central fascia and the basal patch is an angulated band which is whitish on the inner margin and towards the costa is clouded with brownish or testaceous-brown; the apical portion of the wing is of the same hue as the central band and is varied with brownish, and at the ocelloid patch with a few black stripes. The costa is slightly marked with white from the basal patch.

Variety α. The ornamentation is the same, except that the basal patch is reddish-brown and the wing exterior to the basal patch is suffused with dark reddish, leaving however on the middle of the inner margin a whitish patch more or less suffused with reddish.

Variety β. The basal patch is dull reddish-brown and the wing exterior to it is nearly uniform ochreous-gray, without distinct markings.

Mr. Walsh informs me that *H. saliciana* mines a cabbage-like gall peculiar to *Salix longifolia*. Variety *a*, mines a pine-cone-like gall on *Salix cordata*, and I suppose variety *β* inhabits the same gall.

DITULA?

Costa broadly folded, closely appressed and rounded. Apical vein of fore wings simple. Antennæ ciliated, not subserrate and plumose.

Ditula? blandana n. s.—Fore wings reddish ochreous, with the central fascia reddish-brown, oblique, and somewhat diffuse beyond the middle of the wing. On the costa exterior to the central fascia, is a conspicuous, triangular white spot, having on the side next the hinder margin a rounded, reddish brown spot projecting into the costal white spot. The whitish portion of the wing, exterior to the central fascia is striated with reddish-brown. Hind wings pale fuscous. Head and labial palpi reddish-ochreous.

A single specimen, not in good condition, from A. S. Packard, Jr. of Brunswick, Maine.

CNEPHASIA? Curtis.

Cnephasia? maculidorsana n. s.—Fore wings shining, ashen gray, marked with brown. Near the base of the wing, on the fold, is a patch blackish-brown above the fold, and russet-brown beneath it. The central fascia, from the middle of the costa is russet-brown, margined interiorly with dark brown. Near the costal origin of the central fascia, arises a very oblique, russet-colored line, which runs into a russet-colored subterminal line, containing a series of dark brown dots; neither of these lines are very distinctly marked, but this may be owing to the imperfect condition of the specimen under description. Hind wings fuscous.

Two imperfect specimens from A. S. Packard, Jr., Maine.

PERONEA Curtis.

Proc. Acad. Nat. Sci. Phila., Aug. 1860, p. 347.

Peronea flavivittana n. s.—Fore wings dark brown, slightly marked with blackish. Along the dorsal margin is a yellow streak limited towards the costa, by the fold of the wing. In the middle of the wing is an oblique line of elevated scales and two yellow tufts on the fold of the wing, one near the middle and the other near the end of it. Hind wings pale fuscous. Head ochreous: labial palpi dark ochreous.

Resembles the European variety of *P. Hastiana* named *combustana*.

A single specimen. From collection of the Entomological Society of Philadelphia, collected in Virginia.

Peronea gallicolana n. s.—Fore wings dull ochreous or whitish tinted with ochreous. Near the middle of the costa is a semi-oval blackish-brown spot containing blackish dots, and sometimes a whitish spot on the costa. Along the interior edge of this costal spot are a few tufts, and near the base of the fold of the wing is a single black one. The costa near the base is slightly marked with blackish and the apical portion of the wing is clouded with reddish-ochreous-reddish. Hind wings shining, rather dark gray.

Mr. Benj. D. Walsh has bred thirteen specimens of this imago from the gall *salicis strobiloides* and *s. brassicoides*, from Aug. 27th to Sept. 11th. I am indebted to him for four specimens.

CRŒSIA? Hübner.

Proc. Acad. Nat. Sci. Phila., Aug. 1860, p. 352.

Crœsia? unifasciana n. s.—Fore wings, fine deep yellow, marked with dark red. The costa at the base is touched with deep red, and from the basal third of the costa starts an oblique, rather narrow band of the same hue, interrupted over the fold of the wing, leaving a spot on the inner margin a little beyond the middle of the wing. Near the tip are two deep red spots, one on the costa behind the tip, the other nearer the hinder margin beneath the tip. Hind wings pale fuscous-yellow.

Crœsia? fulvoroseana n. s.—Fore wings golden yellow. At the base of the costa is a roseate or pale red spot, and at the basal and apical third of the costa are two spots of the same hue, which are connected by a Y shaped mark, that starts from the middle of the inner margin. The apical margin of the wing is roseate, but the cilia are yellowish. Hind wings fuscous-yellow.

Head yellowish touched with reddish. Labial palpi reddish.

Length of fore wing 3.50 lines.

This imago may be identical with *unifasciana* and the differences between them in ornamentation may be either sexual or the consequence of variation.

A single specimen not in good condition, from A. S. Packard, Jr.

Crœsia? Virginiana n. s.—*Female?* Fore wings bright shining yellow. The Y-like mark that arises from a small patch on the middle of the inner margin, is sanguineous; the branch nearest the base of the wing is entire, rather broad and reaches the costa at the basal third; the branch towards the hinder margin is interrupted at the post-apical vein and on the costa above it is an isolated, nearly round sanguineous spot. Between the exterior branch of the Y-like mark and the hinder margin, are free reticulations of the same hue, the transverse markings of which are broad and one of these beneath the tip of the wing forms a spot. Similar reticulations, although not so heavy, exist between the branches of the Y-like mark. Towards the base of the wing, the reticulations are fainter. Hind wings dark fuscous.

Male? Fore wings rather pale yellow. The Y-like mark is of a brownish-red hue. The exterior branch is less distinctly interrupted and is connected with the costal spot by a slender line, and at the point opposite the costal spot, it is bent towards the hinder margin beneath the tip, where it forms a small roundish spot. The wing is less reticulated than in the female. Hind wings blackish-brown.

Length of fore wing ♀ 4 lines; ♂ 3 lines.

From the collection of the Entomological Society of Philadelphia, collected in Virginia.

Crœsia? gallivorana n. s.—Fore wings of a rich, deep straw color, reticulated with reddish-orange. The Y-like mark is replaced by a purplish-red patch near the middle of the inner margin, slightly produced towards the apex of the wing, a spot of the same hue on the basal third of the costa, and a small one of the same hue near the tip of the wing, extended along the hinder margin, and with which the patch on the inner margin is more or less connected by its short exterior branch. Cilia yellowish. Hind wings whitish, tinted with fuscous. Thorax yellow, with a reddish-orange stripe on each side. Patagia yellow, touched in front wlth reddish-orange. Antennæ fuscous, reddish-orange at base. Head yellow. Palpi reddish-orange, yellow above.

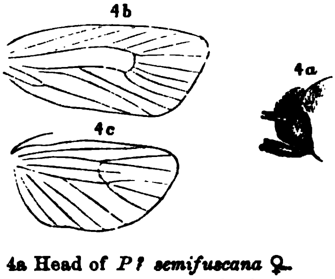
Length of fore wing, 3 lines.

Mr. Benj. D. Walsh, to whom I am indebted for the male specimen above described, makes the following remarks respecting it: "Bred August 24th from the gall *O. brassicoides* Walsh MS. On August

24th I bred a ♀, which only differs from the ♂ in being considerably larger (expanse .77 inch), and in the dark costal spot being confluent with the discoidal dark markings, so as to form an elbow. Perhaps Mr. Walsh intends thus to describe the Y-like mark of the fore wings, which probably exists in the female, while in the male its branches, both the exterior and interior, are almost wanting. He continues: "I have two captured species in my collection, colored and marked very like gallicolana, but differing from it in the front wing being proportionally shorter in comparison with its breadth, and from each other in their markings. I have bred but a single ♂ ♀ of this species."

I have described these various forms as distinct for the reason that the eye detects differences in them, without however believing that they are all specifically distinct. If I should make a conjecture, I should say that *C? gallicolana* is the true species and that *Virginiana* and *fulvoroseana* are most probably variations of it. There is amongst the Tortrices greater specific variation than in any other group of lepidoptera, and some of the European variations would be readily pronounced from their ornamentation to be true species.

PTYCHOLOMA? Leach.



4a Head of *P? semifuscana* ♀.
4b Fore wing. 4c Hind wing.

Hind wings, costal and subcostal veins with independent origins. The branches of the subcostal slightly connivent. The median 4-branched the posterior much separated from the other branches, which are aggregated. The cell is closed by a discal vein without branches.

Fore wings, the costa is broadly folded in the ♂ and regularly arcuated in the ♀; the tip of the wing is rounded and obtuse, hinder margin oblique, the length rather more than twice the breadth.

Head and eyes small. Antennæ in the ♂ minutely ciliated; in the ♀ simple. Palpi as long as the head, rather slender, slightly curved and ascending to the middle of the face and clothed with short scales; the apical joint minute and ovoid; the middle joint appears to be truncate from its clothing which consists of dense, short scales, and is three or four times longer than the apical joint.

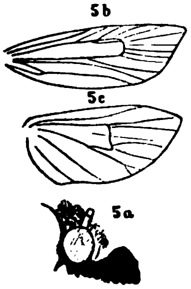
The abdomen in the ♂ is tufted.

The fold of the fore wings is not closely appressed to the surface and has the appearance of being rolled. The surface of the fore wings has a rough, peculiar appearance, without, however, having any raised scales upon them. I cannot determine whether it is the same as the furry appearance described as peculiar to *Ptycholoma Leckeana* of Europe.

Ptycholema? semifuscana n. s.—Fore wings white along the costa and hinder margin, marked with testaceous-brown, ochreous and tarnished silvery stripes and spots. The wing from about the middle of the disk to the inner margin is a dark brown or testeceous-brown varied with ochreous; at the base is an ochreous-brown patch containing a few tarnished or dull silvery spots, and at the anal angle is a large, somewhat obliquely placed, quadrate, testaceous-brown patch, margined with ochreous. and this and the basal patch are separated by a dull silvery stripe. The quadrate patch contains numerous, dull silvery spots. On the costa near the tip is a dark spot of tarnished scales, having on each side an ochreous stripe forming a V, throwing off from its lower part another stripe along the hinder margin. With these stripes alternate others of a dull silvery hue. Cilia whitish. Hind wings dark fuscous. Head brown, somewhat ochreous in front. Palpi dark ochreous. Antennæ dark fuscous.

I have before me three males and one female, all in bad condition, except one of the former. The specimens are from the collection of the Entomological Society of Philadelphia, collected in Virginia, and Mr. A. S. Packard, Jr. of Maine.

STEGANOPTYCHA? Stephens.



5a Head of *S? ochreana*. 5b Fore wing. 5c Hind wing.*

Hind wings, the branches of the subcostal vein are very connivent towards their origin, the lower branch giving origin to the discal vein, which is short and angulated. The median vein is four-branched, the central branch being furcate from the middle or near its tip and the superior branch receiving the discal vein at an angle; posterior vein not remote.

Fore wings, rather narrow in proportion to width; tip rather acute, the hinder margin beneath it slightly excavated, anal angle rounded obliquely. The veins to the hinder margin are somewhat aggregated and the branches of the median vein are turned upward.

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* The artist has represented the last branch of the median vein, furcate at the tip; it should have been the middle branch.

Head and eyes, rather small. Labial palpi a little longer than the head; densely clothed with long scales, beneath and towards the tip, *concealing the apical joint or almost concealing it;* rather slender towards the basal joint; on the upper edge, curved from the base almost to the tip and ordinarily applied to the face.

Steganoptycha? ochreana n. s.—Fore wings pale yellowish, the portion of the wing clouded with pale ochreous-brown. The costa from the middle of the wing to the tip, is streaked with ochreous-brown. The ocelloid patch is white and contains two ochreous-brown streaks and two black dots. The hinder margin, at the base of the cilia is dusted with black. Cilia ochreous. Hind wings whitish tinged with yellowish.

Collection of the Entomological Society of Philadelphia, from Virginia.

Steganoptycha variana n. s.—Fore wings white, with numerous blackish-brown spots and patches, marbled with interrupted streaks and dusted with the same hue. Near the base of the wing, over the fold, is a somewhat triangular blackish-brown, dorsal patch, another smaller one near the anal angle over the fold and an irregular patch above it over the nervules, of the same hue. The inner margin is spotted with blackish-brown from the base, and the costa is marked with oblique streaks of the same hue, leaving between them. white, geminated, oblique streaks, which near the tip have a blackish, central dot. The third blackish streak from the tip, is extended into an oblique marginal patch, that reaches along the hinder margin beyond its middle. The extreme tip is blackish-brown. The ocelloid patch is indistinctly silvery, divided in the middle by a faint blackish line. Cilia white dusted with blackish. Hind wings, grayish fuscous.

Head and palpi whitish, the latter with an exterior blackish-brown spot on the middle joint.

From A. S. Packard, Jr. of Maine, and Easton, Pennsylvania.

Descriptions of North American LEPIDOPTERA—No. 5.

BY AUG. R. GROTE,

Curator of Entomology, Buffalo Society Natural Sciences.

ALYPIA, Hübner.

Alypia Ridingsii, nov. sp. (Plate 5, fig. 1. ♂.)

Anterior wings black, with a slight sub-cyaneous metallic tinge, apex produced, rounded, costa swelled at base. A large basal sub-triangular very pale yellow spot on the median vein, beyond which is a small rounded similarly colored spot on the disc. In the terminal space is a series of five paler elongate spots, neatly separated by the black veins. Posterior wings black, a single moderate pale yellow rounded discal spot, beyond which, in the terminal half of the wing, is a large, somewhat ovate, pale yellow spot, divided inferiorly twice by the black veins. Fringes on all the wings black, except on the apices of anterior wings, where they are marked with white; under surface resembling upper. Head, palpi, orbits of the eyes, black; prothorax whitish; tegulæ, thorax, abdomen and legs black, with a bluish metallic tinge; middle tibiæ with bright orange tufts on their upper surface, not reaching the apex of the joint. ♂. Exp. 1.30 inch.

Habitat.—Colorado Territory, Mr. Ridings. (Coll. Ent. Soc. Phil.)

Resembles *A. MacCullochii*, Kirby, from Canada, but differs from Kirby's figure and description as follows:—The basal spot on the anterior wings is more triangular, not elongated outwardly, nor divided by a black line, the vein being covered with identically-colored scales; the terminal band is broader, composed of five instead of six spots; the "whitish longitudinal one" of the under surface, "on the costal area" is wanting; the spots on the posterior wings are quite different, there being but two spots in our species, the basal one small, rounded, undivided and differently placed; the "costal streak" is also wanting. Judging from Kirby's figure, the costa of the anterior wings in our species is more excavated, apex more produced and rounded; the tegulæ are black, not white, as are also the orbits of the eyes. Mr. Walker's description contradicts Kirby's in giving the middle tibiæ only orange tufts, a character I have given to the present species with some hesitation, the legs in the single specimen I have being imperfect, while Kirby describes *A. MacCullochii* as having orange tufts on anterior and middle tibiæ like *A. octomaculata*.

I name this species after its discoverer, Mr. James Ridings, whose valued labors have added greatly to our knowledge of North American Lepidoptera.

HEPIALUS, Fabricius.

Hepialus pulcher, n. sp. (Plate 5, fig. 3. ♂.)

Anterior wings pale brownish, with a salmon colored tinge, especially on the fringe and margins, with irregular shaped spots and bands of silvery white. One of these on the costa at base, and two more at internal margin; along the center of the wing runs an irregular band which joins within internal angle an oblique sub-terminal uneven band, which latter emerges from the apex; a sub-costal discal spot joined to the central band, and another smaller sub-costal spot before the apex; a terminal series of five small spots extending half way up the wing from internal angle along external margin; under surface immaculate. Posterior wings pale blackish, immaculate, with similarly colored fringes and costa as anterior wings. Thorax and head pale soft sable brown, legs and antennæ darker; abdomen somewhat similarly colored with posterior wings. ♂. Exp. 1.50 inch.

Habitat.—Colorado Territory, Mr. J. H. Ridings. (Coll. Ent. Soc. Phil.)

Resembles the Labradorian *Hepialus hyperboreus* Möschler; judging from the figure of the latter, (W. E. M. Vol. 6, Pl. 1, fig. 1.) our species is larger and the coloration different.

Hepialus gracilis, nov. sp. (Plate 5, fig. 4. ♂.)

Anterior wings cinereous, with very sparse squammation, crossed obliquely by paler undulate bands, of which the best defined runs from the apex, where it broadly bifurcates, enclosing a small costal sub-apical dark spot, to internal margin within internal angle, with a double internal undulate cinereous line. The terminal space bordering this band is covered with bronze and blackish scales, and a space below the median vein is similarly colored, bordered with paler scales and constricted before internal margin; similarly colored scales on costa, and the median space beyond the disc is also covered with them. Posterior wings pale cinereous, with very sparse squammation, a small sub-apical costal darker spot, otherwise without markings. Under surface of both pair pale cinereous, reflecting faintly the markings of the upper surface. Head and thorax covered with dull blackish hairs, those on metathorax pale cinereous; abdomen cinereous. ♂. Exp. 1.35 inch.

Habitat.—Canada (Quebec), Mr. Bowles. (Coll. Ent. Soc. Phil.)

This delicate species is very fragile in appearance, the wings being very thinly covered with scales, more so than any species of the genus known to me.

I am indebted to Mr. J. G. Bowles, of Quebec, for the typical specimen of this hitherto undescribed species.

ARCTIA, Schrank.

Arctia Blakei, nov. sp. (Plate 5, fig. 2. ♀.)

Anterior wings blackish, bands very pale creamy white. A moderately broad band runs from the base of the wing, below the median vein, longitudinally to internal angle, where it becomes furcate, and upon which, in the terminal half of the wing, rests a series of similar bands resembling the letter K, with the straight stroke turned towards the base of the wing and the upper limb, not attaining the external margin, reflexed very obliquely to costa; a narrow perpendicular stripe runs from the costa across the disc, joining the longitudinal band, sometimes appearing in the interspace below it; two costal spots, the outer the larger, and from which latter a very narrow stripe runs interruptedly to the longitudinal band and appears below it, broader, distinct, and continued to internal margin. Median and sub-median veins at base striped with same color as the bands; internal margin and fringes pale creamy white, costa striped with the same color except for a narrow space before the apex; under surface reflecting the ornamentation of the upper surface with a few yellowish scales at base. Posterior wings deep yellow, with a dull red tinge; a series of terminal black spots becoming fused at costal angle, the one at anal angle the largest; discal, costal, sub-costal and super-anal spots, present, black; under surface resembling upper, but greatly paler. Abdomen creamy white, shaded with yellowish red on its upper surface and at base, with a broad dorsal segmentary series of black maculations, and lateral ones reduced; beneath largely marked with black. Head and palpi creamy white; orbits of the eyes black; a black spot on the vertex between the antennæ, which latter are moderate, bi-serrate, blackish, whitish on their outer surface except at extreme tip. Thorax rather deeper creamy white, with two prothoracic and three thoracic black maculations; legs black, marked with whitish; posterior tibiæ and tarsi distinctly striped with whitish on their upper surface. ♀. Exp. 1.20 inch.

Habitat.—Colorado Territory, Mr. James Ridings. (Coll. Ent. Soc. Phil.)

This very elegant and distinct little species resembles *A. virgo* somewhat in the coloration and ornamentation of the posterior wings, as also *A. phylira* in the disposition of the terminal bands on anterior pair. while it is abundantly distinct from either.

I dedicate this species to Charles A. Blake, Esq., of Philadelphia, the Entomologist, and my kind friend.

LAGOA, Harris.

Lagoa cretata, nov. sp.

Anterior wings straighter along the costa than in *L. crispata*, Packard MSS., smooth, silky, milk white, immaculate; fringes concolorous. Posterior wings and fringes similar. Thorax clothed with long pure white hair; head clear pale lemon-yellow between the antennæ, blackish beneath; antennæ pale fulvous brown, stem white at base, shorter and less deeply pectinate than in the allied species; abdomen white, marked with fulvous on the segments as in *L. crispata;* dorsal hairs white, except a large pale lemon-yellow tuft at base. ♂. Exp. 1.20 inch.

Habitat.—Southern States, (Louisiana.) (Coll. Ent. Soc. Phil.)

Readily distinguished from the already described species of the genus by the pure white smooth immaculate anterior wings, with straighter costal margin. The glossy wings of this species recall those of the genus *Porthesia*, with, however, differing squammation, showing the position of Lagoa among the Liparidæ. In the event of more material rendering a generic separation of the present species necessary, I propose the name of *Ulosota* for the new genus.

NOCTUA, Linnæus.

Noctua brunneicollis, nov. sp. (Plate 5, fig. 5. ♂.)

Anterior wings narrow, cinereous, with a uniform, more or less determined, reddish shade; ordinary lines dark, distinct but interrupted. Basal half-line blackish, distinct, straight; transverse anterior blackish, geminate, nearly straight, forming three even curves. Ordinary spots large, distinct, concolorous with the rest of the wing, annulated with a darker line, the reniform broad, but slightly excavated externally; transverse posterior line sub-obsolete, forming black dots on the veins, between each of which the line forms an inward undulation; sub-terminal line diffuse, blackish, broadly marked at the costa, immediately below which it is interrupted, thence with a single outward inclination it is continued distinct to internal margin; fringes long, darker than the rest of the wing. Posterior wings broad, very pale grayish testaceous, immaculate, concolorous, very slightly darker shaded along external margin. Under surface of anterior wings reddish along the costa, rest of the wing blackish cinereous, paler along terminal margin; under surface of posterior wings similar to upper surface except along the costa, where they are powdered with reddish and grayish scales; both pair crossed by a very indistinct blackish line. Palpi and head reddish brown, latter darker on the vertex; collar very dark reddish brown, distinctly contrasted with the thorax and tegulæ which share the coloration of anterior wings. Abdomen somewhat flattened, dark grayish testaceous above, beneath, with anal tuft, of a more reddish hue. Legs dark grayish, becoming brown on the tibiæ and tarsi, latter marked with testaceous at base. ♂. ♀. Exp. 1.40 to 1.50 inch.

Habitat.—Middle States. (Coll. Ent. Soc. Phil.)

Allied to *Noctua clandestina*, Harris (*Graphiphora lubricans*, Walk.) and belonging to the genus Graphiphora of some Authors. It is, however, to this and allied forms that Linnæus' generic term Noctua is at present restricted and should be applied. My correspondence with Mr. Walker has elicited the information that the present species has not been hitherto described.

Noctua cupida, nov. sp. (Plate 5, fig. 7. ♂.)

Anterior wings uniform reddish ferruginous, very sparsely sprinkled with blackish scales, darker shaded in the sub-terminal space, ordinary lines dark, indistinct. Basal line very faint, geminate; transverse anterior geminate, faint, dentate below the costa, thence regularly undulate to internal margin; ordinary spots distinct, annulated with a paler shade, the orbicular very slightly oblique, concolorous with the rest of the wing, reniform moderate, with an evenly blackish center, of the normal shape. Transverse posterior line geminate, very faint, surmounted by two pale costal spots, nearly straight, but slightly arcuated at the disc. Sub-terminal space of an even dull brownish color; sub-terminal line broadly marked with blackish at costa, forming slightly darker points on the veins. Terminal space concolorous with median and basal spaces; fringes blackish. Posterior wings uniformly blackish cinereous, hardly darker shaded along external margin, silky, immaculate; fringes paler, with a central darker line. Under surface of anterior wings reddish along the costa, apex and fringes, rest of the wing blackish cinereous, with a median blackish transverse line indistinct except at costa; under surface of posterior pair paler than the upper surface, shaded with reddish along the costa, irrorate with black scales, and with a faint blackish transverse band and discal spot. Head, prothorax and thorax reddish ferruginous, concolorous with anterior wings, palpi darker laterally. Abdomen flattened, pale cinereous, reddish along the sides and at the anus. Exp. ♂ 1.30 inch.

Habitat.—Middle States. (Coll. Ent. Soc. Phil.)

This would aprear to resemble *Graphiphora expansa* and *G. jucunda* of Mr. Walker by the description of these latter in the British Museum Lists, but I cannot reconcile the diagnoses with the present species.

Noctua alternata, nov. sp. (Plate 5, fig. 8. ♀.)

Anterior wings pale dull ochraceous, slightly olivaceous, sub-terminal space brownish, with a purplish lustre, terminal space very pale ochraceous, ordinary lines geminate, distinct, brownish. Basal, subbasal and median spaces, uniform dull dark ochraceous, slightly paler at extreme base and toward the costa, median space partially shaded with a purplish lustre. Basal half-line geminate, distinct, brownish; transverse anterior oblique, geminate, with a simple sub-costal dentation, thence undulate to internal margin. Ordinary spots very distinct, surrounded by paler annuli, with brownish centers, the reniform slightly shaded with ferruginous; transverse posterior line geminate, interrupted, nearly straight, but little arcuated at the disc, followed by minute black dots on the veins, which latter are paler in the sub-terminal space. Sub-terminal space dark brownish, with a purplish luster, distinctly relieved from the terminal space by the sub-terminal darker marginal line, which is lost inwardly, owing to the dark color of the sub-terminal space. Terminal space paler than the median and basal spaces, with a series of terminal blackish dots between the veins, fringes dark. Posterior wings uniform blackish cinereous, hardly darker shaded along external margin, immaculate; fringes paler with a blackish central line. Head and prothorax rather bright ochraceous; tegulæ and thorax concolorous with anterior wings; abdomen cinereous above, with reddish anal tuft and shaded with the same color beneath. Under surface of anterior wings reddish along the costa and external margin, rest of the wing blackish cinereous, with a median transverse blackish line nearly straight and quite distinct; under surface of posterior wings irrorate with black scales, shaded with reddish, especially on the costa, and with a median transverse distinct black line and discal spot. Exp. ♂. 1.40 inch.

Habitat.—Middle States. (Coll. Ent. Soc. Phil.)

On examining the ornamentation of this species it is seen to be very similar to that of *N. cupida*, while the coloration is very different. It is a slightly larger and more robust species, the reniform spot is relatively larger and nearly concolorous with the orbicular, while the ordinary spots are dissimilarly colored in *N. cupida*.

Noctua vittifrons, nov. sp. (Plate 5, fig. 6. ♀.)

Anterior wings blackish, ordinary lines interrupted, pale; a broad costal dull cream-colored band; ordinary spots sub-obsolete. Transverse anterior line undulate, indistinct; orbicular spot wanting, reniform irregular, dark cream color; transverse posterior line very slightly bent at the disc, followed by a series of similarly colored spots on the veins, which latter are darker shaded in the terminal space; sub-terminal line undulate, continued, broadly marked at costa; fringes somewhat paler than the wing. Under surface whitish, with a blackish sub-terminal shade, broadest at costa. Posterior wings whitish, immaculate, with pale brownish scales along the veins; fringes whitish. Under surface whitish, sprinkled with pale brownish along the costa and at costal angle. Collar concolorous with the costal band of anterior wings, but with a deeper tint at the center; head blackish, paler on the front; palpi blackish, terminal joint pale; thorax and tegulæ blackish; abdomen cinereous above, paler underneath; legs cinereous, tarsi paler. Exp. ♀. 1.35 inch.

Habitat.—Colorado Ter., Mr. J. Ridings. (Coll. Ent. Soc. Phil.)

With *Noctua plecta* Linn. and *N. ochrogaster* Guenée belonging to Boisduval's genus *Chersotis* (Ochropleura Hübn.) It is a more robust and darker colored species than these, and with them cannot be generically separated from the other species of the genus *Noctua.*

ANTHŒCIA, Boisduval.

Anthœcia jaguarina, Guenée.

Mr. Ridings has collected many ♂ and ♀ specimens of this fine species in Colorado Territory, which were taken with the following new species of the genus on flowers during the month of August.

As I have never seen specimens of this species from the Eastern or Middle States, and it would seem to occur frequently in Colorado, it is probable that a more Western Habitat should be given to this species than is understood by the one accorded to it by M. Guenée.

The specimens do not vary materially from M. Guenée's figure and description, or from each other. The general color is paler, the markings less distinct than in M. Guenée's somewhat disproportionate figure, and the markings of the under surface are in certain specimens nearly obsolete.

Anthœcia mortua, nov. sp. (Plate 6, fig. 1. ♂.)

Anterior wings evenly and entirely pale yellowish ochraceous, all the markings obsolete; certain paler undefined marks on the costa indicate the position of the median lines which are not perceptible; terminal space a little paler than the rest of the wing. Posterior wings yellow, without markings except a terminal black band interrupted with yellow on the terminal margin at about the middle. Under surface of both wings paler than upper surface of anterior wings, with a terminal discontinued blackish shade band, and, on anterior wings, a faint discal spot and a few yellowish hairs at base. Head, palpi, thorax, legs and abdomen, pale yellowish ochraceous; of these the thorax is a little the darkest. Exp. ♂. 1.10 inch.

Habitat.—Colorado Territory, Mr. James Ridings. (Coll. Ent. Soc. Phil.)

The anterior tibiæ in the present, as in *A. jaguarina* and all the species about to be described, are furnished with a terminal series of stout short black regularly diminishing spines.

Anthœcia Packardii, nov. sp. (Plate 6, fig. 2. ♀.)

Anterior wings produced at apex, obscure olivaceous ochraceous, darker in sub-terminal space, all the lines narrow, very indistinct and paler. Basal half-line faint; median space lighter shaded; median lines more distinctly marked at costa, the transverse anterior angulated at median vein thence straight to internal margin, transverse posterior arcuated at the disc, the point of reflection approximate to the lower outer corner of the squarish dark colored reniform spot; sub-terminal line dark, marked at costa, interrupted, indistinct. Posterior wings with a very broad terminal black band, straightly margined inwardly; a very narrow pale yellow median band, constricted greatly in the middle by the large lunate discal spot, which is absorbed inwardly by the black color of the base so as not to be readily separated from it; fringes whitish with a distinct cinereous line. Thorax and head colored as anterior wings, abdomen paler, sprinkled with reddish underneath, as are also the legs on the outside. Under surface of anterior wings pale yellow, with a large basal, and rounded discal, black spots; terminal band black, very wide, tapering to costa, leaving the apex and apical terminal margin ochraceous; costa with reddish scales. Under surface of posterior wings yellowish, the broad terminal black band is continued a little over half the width of the wing from anal angle; costa, and terminal margin below the apex, sprinkled with reddish scales; base with a black spot more or less divided by yellowish scales, widely separated from costal margin; internal margin marked with blackish. ♀ ♀ Exp. 1.10 inch.

Habitat.—Colorado Territory, Mr. James Ridings. (Coll. Ent. Soc. Phil.)

Larger and sufficiently distinct from *A. lynx*, of our Eastern and Middle States, which it somewhat resembles.

I name this fine species after Mr. A. S. Packard, Jr., whose entomological writings I very greatly appreciate.

Anthœcia nobilis, nov. sp. (Plate 6, fig. 3. ♀.)

Very much resembling *A. Packardii;* the coloration of the anterior wings is different, the basal and sub-terminal spaces being strongly tinged with reddish; the median lines are distinct, white; the transverse anterior more undulate; the median yellow band of the posterior wings is slightly broader. The thorax shares the reddish tinge of the basal and sub-terminal spaces on anterior wings. Notwithstanding these differences, it has much the same general appearance, and I look for more material from the locality with interest, the more so as I have an individual in poor condition which appears intermediary. Exp. 1.10 inch.

Habitat.—Colorado Territory, Mr. James Ridings. (Coll. Ent. Soc. Phil.)

Anthœcia brevis, nov. sp. (Plate 6, fig. 4.)

Thorax robust; wings short; abdomen slender. Anterior wings dark olivaceous, shaded with dark brown in basal and sub-terminal spaces, ochraceous in median and terminal; median lines whitish, distinct. Basal half-line obsolete; transverse anterior line forming three outward curves, of which the costal one is a simple tooth; median space ochraceous, shaded with olivaceous; median shade undulate, distinct, bordering the darker ill-defined reniform spot; transverse posterior line regularly sinuate, as in the other species of the genus, spreading a little on the veins in the sub-terminal space, which are afterwards marked with blackish. Sub-terminal space wide, constricted shortly below the costa and again more slightly above internal angle, owing to the course of the sub-terminal line which is indistinct but somewhat darker than the s. t. space which it margins outwardly; terminal space narrow, somewhat darker than median; fringes dark ochraceous, broadly and distinctly interrupted with dark olivaceous. Posterior wings black, with a sub-basal macular band of three small dark yellow spots, the one on the costa extending along the same to base; fringes whitish, their base yellowish, internal margin lined with yellow hairs. Under surface of anterior wings yellowish; a large black basal spot and a broad sub-terminal black band, leaving the terminal margin entirely yellowish and absorbing the discal spot; costa reddish. Posterior wings largely marked with reddish along the costa, which shade tinges superiorly a sub-median line which is blackish at and above anal angle, where it is absorbed by the wide blackish terminal demi-band which it borders internally; discal spot blackish tinged with reddish, base blackish inferiorly. Thorax and head dark ochraceous, shaded with bright ferruginous; abdomen blackish on the segments above, beneath reddish ochraceous, as are also the legs and under surface of thorax. ♂ ♂. Exp. 1 inch.

A ♀ specimen (Plate 6, fig. 5), differs by the pale more ochraceous thorax; the abdomen is blackish above and below except on the anal segment, the under surface is almost entirely blackish while the upper surface of posterior wings is entirely black, wanting the yellow spots, as well as the yellow hairs along internal margin. This may be a variety; I have insufficient material to determine its position; such sexual differences have not been met with as yet in the genus.

Habitat.—Colorado Territory, Mr. J. Ridings. (Coll. Ent. Soc. Phil.)

The present species presents some resemblances to the description of *Anthœcia bina*, Guenée, but I infer that that species is generically distinct.

If, in arranging the genera of the subfamily to which Anthœcia belongs, we precede this genus by Heliothis and allies, the following seems to be the natural order of its species, all of which are known to me in nature.

ANTHŒCIA, Boisd.

jaguarina, Guenée.
mortua, Grote.
Packardii, Grote.
nobilis, Grote.
lynx, Guenée.
brevis, Grote.
Spraguei, Grote.
arcifera, Guenée.
marginata, Haworth.
  rivulosa, Guenée.

I separate from this genus *Melicleptria tuberculum*, Hübner, and *Anthœcia bina* Guenée, joining to them a third, hitherto undescribed, from Colorado Territory, under the generic name under which Hübner described the first species, and which term is used in the "Verzeichniss" for the species of *Heliothis*.

MELICLEPTRIA, Hübner.

Melicleptria tuberculum, Hübner.
Melicleptria tuberculum Hüb., Zutr. No. 259. fig. 517, 518.
Anthœcia tuberculum Guenée, Noct. II. p. 185.
Walker, C. B. M. Noct. p. 695.
Grote, Proc. Ent. Soc. Phil. Vol. 2. p. 343.

Habitat.—"Pennsylvania," (Hübner.)

Unknown to me.

Melicleptria bina.
Anthœcia bina Guenée, Noct. II. p. 186.
Walker, C. B. M. Noct. p. 695.
Grote, Proc. Ent. Soc. Phil. Vol. 2. p. 344.

Habitat.—"North America," (Guenée.)

Unknown to me.

Melicleptria villosa, nov. sp. (Plate 6, fig. 6. ♀.)

Wings blackish; the anterior pair evenly covered with olivaceous yellow hairs, giving them a paler appearance than the secondaries, and in certain lights a somewhat golden reflection. A single line, the transverse posterior, present, whitish, arcuated, distinct; reniform spot large, whitish, rounded, prominent; terminal space paler than the rest of the wing. Posterior wings black, with a median macular band corresponding to the transverse posterior line of the anterior wings, consisting of two disconnected whitish spots; fringes whitish. Under surface prominently marked: anterior wings black at base, along the costa, and on terminal space except the apex which is whitish, median space white, with a large black discal spot; posterior wings with the internal margin, base, a discontinued broad terminal demi-band and large discal spot, black; costa and rest of the wing white. Thorax and abdomen blackish, former covered with olivaceous hairs, which become paler on the prothorax and underneath; terminal abdominal segment whitish, ovipositor exerted. ♀. Exp. 0.65 inch.

Habitat.—Colorado Territory. Mr. James Ridings. (Coll. Ent. Soc. Phil.)

CATOCALA, Ochsenheimer.

Catocala piatrix, Grote.

Catocala piatrix, Grote, Proc. Ent. Soc. Phil. Vol. 3. p. 88. Pl. 3. fig. 3. ♂.

♂ ♀. Anterior wings slightly silky, dark brownish, sparsely powdered with greenish gray scales along the veins in the terminal space, and shaded undefinedly with blackish brown in the sub-basal space, on the costa above the discal space, and obliquely sub-apically in the terminal space. Basal half-line black, with a single tooth, terminating with an outward inclination. Sub-basal space brownish darker shaded contiguous to transverse anterior line. Transverse anterior line geminate, blackish, with the outer line indistinct, with an obsolete sub-costal tooth, irregularly undulate. A paler costal shade spread obliquely from the costa over the sub-reniform spot. Reniform, brownish, tinged with black, thrice excavated externally, followed by a blackish roundedly defined shade, which in some specimens obscures the external defining line of the reniform spot; sub-reniform obliquely elongated, surrounded by the transverse posterior line, (in a single specimen open), pale, well defined. Transverse posterior line black, distinct, of equal width, with prominent terminal inflections, the tooth acute, prominent, shaded with black and of a nearly equal size.

Sub-terminal space narrow, of a more or less decided reddish brown tinge; the sub-terminal line geminate, the two lines enclosing a paler shade; terminal line black, distinct, regularly undulate; terminal margin strongly marked; fringes brownish. Posterior wings slightly silky, deep yellow, internal margin and extreme base clothed with long brownish hairs; median band black, not much constricted on the disc, tapering suddenly to internal margin. Terminal band black, wide, nowhere deeply constricted, terminating ordinarily a little before anal angle. Under surface of both pair pale grayish ochraceous, iridescent, irrorate, basally and sub-discally tinged with an orange shade; anterior wings crossed by three, posterior pair by two black transverse bands. Thorax concolorous with anterior wings; tegulæ with an internal bordering darker line; a dark brown line on the prothorax; abdomen above dull brownish, below, with under surface of thorax and legs of a pale grayish ochraceous shade; upper surface of legs brownish, tarsi annulated. Exp. 2.70 to 3 inches.

Habitat.—Eastern and Middle States. (Coll. Ent. Soc. Phil.)

Of common occurrence.

I allow the present description to supercede the one given by me on page 88 of the present volume, having received a fine series of this very distinct species from which I have perfected its specific description. My figure represents a specimen in which the posterior discal shade obscures the external defining line of the reniform spot, which latter receives a much larger rounded shape in consequence.

As I have elsewhere stated, the specimen of this species in the British Museum was determined as *C. palæogama;* Guenée's species is, however, perfectly distinct and different from the present.

SYNEDA, Hübner.

Syneda Howlandii, nov. sp. (Plate 6, fig. 7. ♀.)

Anterior wings brown, wanting the purplish shade of *S. graphica*, Hüb., which the present species resembles in ornamentation, but is much more robust. The transverse anterior line is bi-undate, the median shade oblique, regular, not undulate as in *S. graphica.* The transverse posterior line is similar, but the sub-terminal is quite distinct, brownish. The posterior wings are pale brick red, thus differing greatly from the yellow ones of *S. graphica*, while the black bands are much narrower, the terminal one linear, except at the center, where it forms a black blotch, coloring also the fringes. Thorax stouter, paler than in *S. graphica*, with two dark tergal lines; abdomen testaceous brown; under surface of body clothed with whitish hairs much as in *S. graphica.* Under surface of wings pale reddish; anterior pair paler, with a very oblique blackish incomplete median band, as also a sub-terminal one broadest at costa, shortly discontinued; posterior pair with a black discal lunule and interrupted sub-terminal band. ♀. Exp. 1.40 inch.

Habitat.—Colorado Territory, Mr. James Ridings. (Coll. Ent. Soc. Phil.)

I dedicate this species to my friend Theodore Howland, Esq., of Buffalo, N. Y., as the sense of my appreciation of his labors in behalf of the Buffalo Soc. Nat. Sciences.

AMPHIDASYS Treitschke.

Amphidasys cupidaria, nov. sp. (Plate 6, fig. 8. ♂.)

Anterior wings dull brownish, with yellowish white blotches along the costa, at apex and base. Median shade line distinct, angulated at the disc, thence straightly oblique to internal margin. Transverse posterior line black, irregular, bordered outwardly with whitish, originating at the costa from a large diffuse yellowish white blotch; sub-terminal space marked with whitish. Posterior wings resembling anterior, the median black line is bordered externally with whitish. Thorax and vertex yellowish white; abdomen brown, crested, marked with whitish; head and thorax underneath dull brownish; legs dull brownish, marked with white. Under surface of wings evenly testaceous yellowish, markings brownish; both surfaces are sparsely covered with indistinct irrorations. Exp. 1.80 inch.

Habitat.—Middle States, Mr. J. Meyer, Brooklyn, L. I.

This is perhaps a variable species. I have a ♂ specimen before me, for which, as well as for the type before me, I am indebted to the kind offices of Mr. S. Calverley, which is almost entirely dull brownish, with merely three costal spots on the anterior wings, one apical, a second bordering externally the origin of the t. p. line and one bordering the t. a. line at the costa, which latter line is not perceivable in the specimen I have just described, and is discontinued in the present individual shortly below the costa. The abdomen and thorax are entirely brown except a few whitish hairs on the collar. If this is a variety of *A. cupidaria*, it will eventuate that the species will be found exposed to great variation. I am inclined to believe it distinct, however, and wait the discovery of fresh material to confirm me in this opinion.

From *A. cognataria* Guenée, our commonest species, the present is easily recognisable; from *A. pœnulataria* Grote, which I have somewhat inadequately illustrated, the present species differs in the ornamentation of the anterior wings, and wants the large distinct irrorations and black collar. It is possible that *A. speratarıa* Walker is identical with this latter species, of which I cannot be certain, from the somewhat short diagnosis in the B. M. Cat., and at the time I published the species I was uninformed of the existence of Mr. Walker's description.

⁂

Notes on Certain Species of North American LEPIDOPTERA.

BY AUG. R. GROTE.

Gorgopis 4-guttatus, Grote.

In response to my query, Mr. Walker kindly informs me that the specimen referred to in the Lep. Cat. B. M. as *Hepialus argenteomaculatus* var.? belongs to the present, and not to Dr. Harris' species, and I conjecture that the ♀ specimen mentioned by Dr. Harris in Agassiz's "Lake Superior," as coming from that latter region, should also be referred to this species, which is readily distinguished from the Eastern *argenteomaculatus*, Harris, by the smaller white guttations of the anterior wings, surrounded by black annuli, and the grayish pink or pale salmon color of the metathorax, abdomen and posterior wings.

Lithosia argillacea, Packard.

My specimen, a female, the abdomen distended with eggs, was taken by Mr. Robert Kennicott on the Athabasca River, and suffered during the transportation, the under surface becoming discolored through some extraneous substance, giving the specimen a concolorous appearance, which I erroneously accepted as the proper coloration of the species; on submitting the specimen to certain tests, the small palpi are plainly yellow except at their tips, coxæ and terminal abdominal segment clothed with hairs of the same color, so that notwithstanding the different latitude of occurrence and smaller size of *L. bicolor*, Grote, I consider it identical with the species from the Eastern States. Although the name I proposed for this species would apparently have the priority, under the circumstances I prefer to retain the one proposed by Mr. A. S. Packard, Jr.

Halisidota tessellaris, Abbot and Smith.

From Mr. Benj. D. Walsh's description of *Halesidota Antiphola*, Proc. Boston Soc. Nat. Hist. February, 1864, p. 288, I am enabled to refer it as a synonym to the present species. That the imago is entirely identical with Abbot and Smith's species is conceded by Mr. Walsh in the first lines of his description: "The imago of this species is utterly undistinguishable from that of *H. tessellaris*, Sm. Abb. and Harr." The validity of the supposed species rests upon a stated difference of larval structure affecting the location of the "hair pencils," a differing coloration of the latter and a varying food-plant. Subsequent investigation, I am informed, has contradicted the first of these asserted differences, which, indeed, on the supposition that it existed, would rather indicate a generic than a specific character, and I consequently omit any further remarks upon it. There remains, then, a differing coloration of the larval "hair pencils" and a differing food-plant as the totality of specific characters which are to constitute the new species. Analogous instances of larval variation in the coloring of the "hair" among members of the present family have been discovered without having been made the basis for the description of a new species, and may be correctly regarded as simple variations within the "well defined limits of the species," while the habits of the differing larva as to the food-plant, especially in such an essentially polyphagous family as the Arctiidæ, can with difficulty be drawn in as a specific character, even upon much more detailed and perfect evidence than Mr. Walsh has offered in the present instance. Should my views on this description of Mr. Walsh's obtain, and more especially on a second to be hereinafter mentioned, it will ensue that the "Entomological Speculations" based upon the view of the validity of these of Mr. Walsh's species, and given in so-called "gradations" on page 298, l. c. will of themselves fall to the ground. It is not the most inconsistent part of Mr. Walsh's Paper, that while *H. Antiphola* is published as "n. sp.," it is regarded on page 298 as merely in process of "formation;" no such forms have been hitherto announced in Entomological Science, and a specific name in its present acceptation is only improperly to be applied to them.

I find in the "Verzeichniss bekannter Schmetterlinge," 1816, the generic term written *Halisidota;* I do not know why later Authorities, in transcribing the same, should have altered it to *Halesidota*.

Euprepia americana, Harris.

Auf Seite 74 dieses Bandes habe ich gezeigt dass diese Art mit dem Europäischen *Euprepia caja*, Linn., von Herrn Walker und Möschler verwechselt wird. Zu den von mir angegebenen Merkmalen fügt Herr Packard auf Seite 114 dieses Bandes noch Weitere. Ein Theil der angegebenen Merkmale sind jetzt von Möschler auf Seite 196, Band 8, der Wiener Entomologischen Monatschrift auch aufgeführt, aber immer noch den falschen Namen bei behalten. Diese Art wurde von Herrn Walker als *Arctia caja* determinirt und der Name *americana* von Dr. Harris für *Arctia parthenos* Harris, unrechter weise gebraucht, (Proc. Ent. Soc. Phil. l. c.) Zu der wirklichen *Arctia parthenos* Harris, habe ich (l. c.) *Arctia borealis*, Möschler, gezogen, später ist diese Art von der Harrisschen von Herrn Packard getrennt. Meine Exemplare dieses Spinners zeigen grosse Veränderlichkeit in der Zeichnung beider Flügel und bleibe ich der Meinung dass beide Namen sich auf eine Art beziehen. Immerhin scheint es Herrn Möschler unbewust dass ähnliche Arten hier zu Lande längst beschrieben wurden. Auf Seite 195 l. c. hat Möschler eine *Arctia speciosa* veröffentlicht welche mit *Arctia virguncula*, Kirby, eine grosse Ähnlichkeit hat nur sind die von Möschler gegebenen Abbildungen etwas kleiner als die hiesigen Exemplare dieser Art, welches vielleicht die weiter nördliche Herkunft seiner Exemplare veranlasst; jedenfalls hätte es mit Kirby's Art verglichen werden sollen. Ich habe mich in einer fremden Sprache ausgedrückt, fürchtend dass H. Möschler in Kronförstchen bei Bautzen das Englische nicht versteht, hoffentlich aber mein Deutsch, welches wahrscheinlich nicht so rein ist wie meine Absicht.

CLISIOCAMPA, Curtis.

Clisiocampa disstria,

Phalæna neustria, Abbot and Smith, Lep. Ga. p. 117. Pl. 59. (1797).
Not *P. neustria,* Linn., Syst. Phal. 35.
Malacosoma disstria, Hübner, Verz. bek. Sch. p. 192. (1816).
Clisiocampa sylvatica, Harris, Rt. Ins. Mass. (1841).
" 3rd Ed. p. 375–378. Pl. 7. fig. 18–19. (1862).
Morris, Syn. Lep. N. A. p. 236. (1862).

It will be seen that Hübner, as early as 1816, detected the error of Abbot and Smith in regarding our species as identical with the European *C. neustria*, the name proposed by him should thus be retained, having priority over subsequent descriptions. Fabricius' *B. americana* being now entirely unknown, I propose that Dr. Harris' name be retained for the second N. Am. species of the genus—*Clisiocampa americana*, Harris.

ADELOCEPHALA, Boisduval.

Adelocephala bicolor.

Dryocampa bicolor, Harr., Rt. Ins. Mass. (1841).
" 3rd Ed. p. 401. (1862).
Walsh, Proc. Bost. Soc. Nat. Hist. p. 293. (1864).
Sphingicampa distigma, Walsh, Proc. Bost. Soc. Nat. Hist. p 290. (1864).
Anisota bicolor, Grote, Proc. Ent. Soc. Phil. p. 93. (1864).

From *Anisota* the present species differs by the pectinations of the ♀ antennæ, among other sufficiently distinctive generic characters. After having seen Mr. Walsh's material I am of opinion that the specimens he describes as *Dryocampa bicolor* and *Sphingicampa distigma* belong to one and the same species. I am indebted to the kind offices of F. G. Sanborn, Esq., for the information that no specimens of this species remain in Dr. Harris' collection at the present day, but have no doubt that the identification of Dr. Harris' description by Mr. Walsh, and with which specimens in the Coll. Ent. Soc. Phil. correspond, is the correct one. We are indebted to Mr. Walsh for the discovery and lucid description of the larva of this interesting and fine species, differing remarkably structurally from the larvæ of the nearly allied species of *Anisota*. Judging from the figures of Dr. Herrich-Schæffer, our species is generically identical with the South American forms which are figured in Lep. Exot. fig. 77–78, 306–307, and perhaps fig. 304–305, and for which *Adelocephala* Boisd. is retained. Should, on an examination of actual specimens, our species be found generically distinct, the name proposed by Mr. Walsh will prevail, and our species be known as *Sphingicampa bicolor*.

Notodonta basistriens, Walker.

I am informed by Mr. Walker that my identification of this species on page 93, Pl. 1, fig. 1, ♂ huj. scrip. (1864), is correct, corresponding with the typical specimen in the British Museum Collection.

Notodonta stragula, Grote.

Unnamed specimens of this species have been found by Mr. Walker in the Brit. Mus. Coll. Specimens taken in Pennsylvania have since been received by the Phil. Entomological Society; it will probably occur throughout the Eastern and Middle States.

Edapteryx bilineata, Packard MSS., (Plate 6, fig. 9. ♀.)

This graceful North American Platypterid genus and species has been communicated to me by Mr. A. S. Packard, Jr., its discoverer. Subsequently the ♀ specimen from which the accompanying figure was made, was taken in Pennsylvania, and is now in the collection of the Entomological Society.

Heterocampa subalbicans, Grote.

Mr. J. G. Bowles has sent me a ♀ specimen of this species, taken near Quebec, Canada.

PSEUDOTHYATIRA, Grote.

Pseudothyatira cymatephoroides.

Thyatira cymatophoroides Guenée, Noct. 1. p. 13. (1852).
Walker, C. B. M. Lep. Noct. p. 8. (1856).
Lacinia cymatophoroides Grote, Rev. N. A. Cym. P. E. S. P. p. 58. (1863).
" Proc. Ent. Soc. Phil. p. 134, *larva*. (1863).
" Proc. Ent. Soc. Phil. p. 337. (1863).

Habitat.—Eastern and Middle States, and Canada. (Coll. Ent. Soc. Phil.)

Pseudothyatira expultrix.

♀ *Thyatira cymatophoroides* Guenée, Noc. 1. p. 14. (1852).
Var. *β*. " " Walker, C. B. M. Lep. Noct. p. 8. (1856).
Lacinia expultrix Grote, Rev. N. Am. Cym. P. E. S. P. p. 58. Pl. 2. fig. 6. ♀. (1863).
" Proc. Ent. Soc. Phil. p. 134, *larva*. (1863).
" Proc. Ent. Soc. Phil. p. 337. (1863).

Habitat.—Eastern and Middle States, and Canada. (Coll. Ent. Soc. Phil.)

I propose the present generic name instead of *Lacinia*, which might lead to some confusion, owing to its having been used in the Mollusca. I have ♂ specimens of both these species, quite distinct generically from *Thyatira* as I have already shown, from Mr. Russell, of Quebec, Canada.

I find in C. B. M. the following expression of Mr. Walker's relating to *T. cymatophoroides*:—"This species differs much from the other *Thyatiræ*, and will probably be separated from that genus."

Leucania unipuncta, Haworth.

This species has occurred to me very plentifully in New York State, and I have seen it in very nearly every collection submitted to me, from both Eastern and Middle States. The assertion that it is not found in these localities, made by Mr. Walsh in the "Trans. of the Illinois Ag. Soc.," is, therefore, as incorrect as the premises on which the statement is founded are inadequate to support it.

ACHATODES, Guenée.

Achatodes zeæ.

Gortyna zeæ Harris, Rt. Ins. Mass. (1841).
" 3rd Ed. p. 439. Pl. 7. fig. 9. (1862).
Achatodes sandix Guenée, Noct. 1. p. 132. Pl. 6. fig. 4. (1852).
Walker, C. B. M. Lep. Noct. p. 166. (1856).
H-S., Con. Blatt. p. 73. (1860).

On page 432, Proc. Ent. Soc., Phil., 1864, I noted of Dr. Harris' *Gortyna zeæ* that I did not believe it correctly placed under *Gortyna*, not recognizing the species from either Dr. Harris' description or the figure in the 3rd Edit. of Ins. Mass., which latter, while well drawn, is quite wrongly colored, so as to mislead the student as to the species intended. I am again much indebted to F. G. Sanborn, Esq., for an opportunity of examining the specimens of Dr. Harris' species, and which prove to belong to *Achatodes sandix*, Guenée. This genus is readily distinguished from Gortyna by its non-falcate anterior wings. The habits of the larva of the single species known, being an internal feeder in the stems of the Indian corn plant, induced Dr. Harris to refer it to the genus *Gortyna*. M. Guenée refers Achatodes to his family Apamidæ, where it is disadvantageously placed, I must think. The genus shows more affinity with the Glottulidæ of the same Author, a group of Gortynid genera, with brilliant colors and rounded apices of anterior wings, of which the larvæ are internal feeders, and is allied to *Euthisanotia* Hübner. (*Philochrysa* Grote.)

Catocala Clintonii, Grote.

Mr. Walker informs me that a specimen of this species is contained in the Brit. Mus. Coll., and referred to in the Cat. as *C. neogama* A. and S. The latter species is, however, quite distinct and much larger. I am unaware that specimens of Abbot and Smith's species, taken in the Southern States, have been compared with our more Northern specimens, which are described by Guenée as *C. neogama*, as may be readily inferred by the expression "Ailes infer. d'un jaune d'ochre foncé," our species differing in this respect from Abbot's figure, which represents the posterior wings of a very bright, rather light, yellow.

Catocala palæogama, Guenée.

This, as I have elsewhere stated, is not the British Museum species registered by Mr. Walker under this name. The B. M. specimens belong to *C. piatrix*, Grote.

ANOMIS, Hübner.

Anomis xylina, Say.

Noctua xylina Say. (1827).
Say, LeConte, Vol. 1. p. 370. (1859).
Anomis bipunctina Guenée, Noct. II. p. 401. (1852).
Walker, C. B. M. Lep. Noct. p. 988. (1856.)

This is the species which infests the cotton plant, a very distinct insect from *Leucania unipuncta* Haw., the so-called "army worm" of the Northern States. I regret not having specimens of this species, but have no doubt as to the correctness of the above references after comparing the descriptions.

Philemma henrietta, Grote.

Dr. Morris, of Baltimore, kindly communicates to me the circumstance that this species has occurred to him in Maryland. Specimens have been shown to me as having been taken in New York State, so that the Habitat of this species will have to be extended to include these localities.

Plusia æreoides, Grote.

A specimen of this interesting species has been sent to me by Mr. Bowles, taken near Quebec, C. This species has occurred to me in New York State, and I have hitherto received specimens from both Eastern and Middle States. It constantly differs from *P. ærea*, Hübner, its congener and nearest ally, by its straight median lines, the transverse posterior followed by a golden metallic shade band tapering to costa, and distinct discal spots. Its general coloration is paler, while very similar to that of *P. ærea* Hüb., than which it appears to be more uniform in size, while it is very probably as universally distributed on this continent.

Eriopus monetifera, Guenée.

A specimen of this beautiful species has been sent to me also by Mr. Bowles, taken near Quebec. Specimens have occurred also to Mr. C. A. Blake, in New Jersey.

Baptria albovittata, Guenée.

A ♂ specimen of this interesting species has been sent to me by Mr. Russell, taken near Quebec, C., and differs from my figure (Proc. Ent. Soc. Phil. Vol. II. Pl. 3. fig. 3 ♀.) by the absence of the three white dots near the costa posterior to the band on anterior wings, and the presence of an accessory dot near internal angle.

ERATEINA, Doubleday.

Erateina infulata.

Baptria infulata, Grote, Proc. Phil. Ent. Soc. Vol. 2. p. 67. Pl. 3. f. 4. ♂. (1863).

Habitat.—Virginia. (Coll. Ent. Soc. Phil.)

Erateina elaborata.

Baptria elaborata, Grote, Proc. Phil. Ent. Soc. Vol. 2. p. 67. Pl. 3. f. 5. ♂. (1863).

Habitat.—Virginia. (Coll. Ent. Soc. Phil.)

Following Dr. Herrich-Schæffer I referred these two species to *Baptria*, Hüb., which is now restricted on this Continent to *Baptria albovittata*, (*Odezia albovittata*, Guenée.) Subsequently Dr. Herrich-Schæffer's species, figures 75, 76 and 320—321 Lep. Exot., have been placed in the present genus to which I now refer the only described species found North of Mexico, and which, resembling *Erateina erota*, Cramer, from Surinam, differ from the numerous other described species of the genus by the bluish metallic exterior transverse lines, broadly marked in Cramer's figure, narrower in our species where they are observable only in certain lights, and are not indicated on my Plate. I do not perceive on the posterior wings in the males of our species the exaggeration of the fold along the abdominal margin mentioned by M. Guenée.

The South American species contained in Group 1, Guenée, in which the posterior wings are produced at anal angle into tail-like appendages. should perhaps be separated generically.

On the Insects, COLEOPTEROUS, HYMENOPTEROUS and DIPTEROUS, inhabiting the Galls of certain species of Willow.

PART 1st.—DIPTERA.

BY BENJ. D. WALSH, M A.

I propose in the following pages to name and describe the Galls, which I have found on several species of Willow in the neighborhood of Rock Island, Illinois, and also the insects which produce those galls, not only in the imago state, but in all their states so far as known to me. I propose at the same time to name, and, so far as they are hitherto undescribed, to describe several other insects, which habitually breed in the galls formed by the true gall-makers, and which, as they feed on the substance of the gall itself and only occasionally or incidentally destroy the gall-making insect, may be appropriately considered as Inquilines or Guest-flies. Besides these last, there is a great variety of true Parasites, mostly Chalcididæ, which prey, not on the gall, but solely and exclusively on the body of the Gall-maker or on that of some of the Inquilines, and which I shall only refer to so far as they are concerned with the other subjects herein discussed. The field thus opened to our view, though very extensive, is almost an untrodden one; for out of the great multitude of N. A. willow-galls, but two, so far as I am aware, have been up to this day named and described, viz. *Salicis* Fitch (=*rigidæ* O. S.) and *strobiloides* O. S.; and in the case of the latter, the insect that produces it has hitherto been totally unknown in all its states.

As in my other published descriptions, I have wherever possible described from a large number of specimens and carefully given all the variations, so as to define the species itself and not merely the individual, stating in every case the number of specimens as a measure of the value of the description. I have also, as heretofore, aimed at making the descriptions as accurate and definite as possible, and with this object in view have uniformly sacrificed brevity to precision. To the more advanced student, perhaps, this is not always desirable; but to the neophyte what information does it convey to say, for example, "Antennal joints spherical, pedicels short, verticils long," when he knows not how long the pedicels and verticils usually are? Whereas if we say, "Antennal joints spherical, pedicels ½ as long as the spherical part of each joint, verticils as long as the two entire joints from which they spring," he can form in his mind's eye a complete idea of the antenna, and an artist might even draw a very tolerably accurate picture of it from the description alone. In a Synopsis, indeed, of species already described, such diffuseness is not necessary, for we know where to go for the full description; but he that undertakes to describe new species should endeavor to describe them in so full, definite and precise a manner, as to comprehend every variety that can possibly come under the notice of the student, and to separate his new species effectually from all species already described or hereafter to be described.

I regret much that, from the almost total lack of scientific facilities in the Great West, I have been unable to compare the Willow-galls now described with the published Willow-galls of Europe, so as to decide the interesting question whether any of them are identical. To the Eastern Entomologist, who lives, not in the backwoods but in a civilized community, this would be comparatively an easy task and indeed almost a matter of course. To the Western Entomologist it is an impossibility. Illinois, as the last Census shows, produces now more maize and more wheat than any other State in the Union; and, as the New York Market Reports show, she also produces more beef cattle than any other State in the Union. But she has hitherto failed to produce a single Public Scientific Library worthy of her wealth and her great and growing resources.

It is well known to Botanists that the genus Salix (willow) is a very extensive and difficult one, and that authors have differed greatly as to whether certain forms are true species or mere varieties. I am indebted to M. S. Bebb, Esq., of Washington, D. C., who has paid special attention to this Botanical group, for naming the species found in this vicinity from specimens which I had prepared for that express purpose. The accurate determination of the species of our Willows is the more valuable and important here, because I find it to be a very general, though probably not a universal rule, that each gall-making insect confines itself to a particular species of Willow. As to the larger and more abundant and more conspicuous galls, such as *Salicis brassicoides* n. sp., *S. rhodoides* n. sp., *S. strobiloides* O. S., *S. ænigma* n. sp. and *S. pomum* n. sp., I am quite certain from long, close and continued observation, that the rule holds good universally so far as regards the several species of Willow found near Rock Island. I have repeatedly, for instance, noticed a willow-bush bearing apparently numerous specimens of both *S. brassicoides* and *S. strobiloides*, but on examining the foliage I have always found, that the two different willows that bear these two galls were here growing promiscuously from the same spot of ground, and that each branch of each species bore its appropriate gall, and never the gall peculiar to the other species of willow. The instances where these two willows grew side by side, or only removed a short distance from each other, and where I found each bearing exclusively its appropriate gall, are almost innumerable. This fact is the more remarkable, because the Willows form a very extensive genus, with the species often separated from each other by very minute distinctions. We meet, however, with an analogous case in the gall-making Hymenopterous genus *Cynips*, where with occasional exceptions each species is confined to a distinct species of Oak; while, on the other hand, the gall-making *Cecidomyia* of the Hickory are said by Osten Sacken to be "found indifferently on the various species of that tree." (*Synopsis Dipt. N. A.*, p. 191.)

It does not follow, however, because certain galls are found exclusively on particular species of willow near Rock Island, that the identical same gall may not occur in other localities on other species of willow which do not grow near Rock Island. A willow-gall (*Salicis* Fitch, which being preoccupied has been changed by Osten Sacken to *rigidæ*) closely resembling, so far as can be judged from Dr. Harris's brief description, my *S. siliqua*, which is found on Salix humilis Marshall, is said by Dr. Fitch to be found on S. rigida and S. lucida; and I have found a gall which differs only in some few slight characters from that found on S. humilis, and which for the present I consider as identical with it, to occur sparingly on S. cordata Muhl.; and though I could not succeed in breeding the imago from this gall, yet the larvæ of the two galls were absolutely undistinguishable. S. rigida, one of the two willows on which Dr. Fitch found his gall, is regarded now by most botanists, according to Mr. Bebb, as a mere variety of S. cordata on which I found one of my two galls. I have also found a single specimen of what for the present I regard as the same gall on S. discolor. So that if the four galls be in reality identical, we have here a case of the same gall growing on four distinct species of willow, S. rigida (=S. cordata), S. lucida, S. humilis and S. discolor.

The species of willow which grow near Rock Island, all of them in great abundance, with the single exception of the first, which is exceedingly rare, are named by Mr. Bebb as follows :—1*st*. Salix discolor Muhl. 2*nd*. S. cordata Muhl. 3*rd*. S. longifolia Muhl. 4*th*. S. nigra Marshall. 5*th*. S. humilis Marshall. The *first* species produces one very distinct gall, No. 6, and two that are apparently identical with Nos. 8 & 12, which occur on S. humilis. The *second* produces four very distinct galls, Nos. 2, 10, 17 & 20, besides varieties of the very same two galls, Nos. 8 & 12, of which varieties occur on S. discolor. The *third* three galls, Nos. 1, 9 & 19. The *fourth* two galls, Nos. 14 & 15. And the *fifth* and last the astonishing number of ten distinct galls, Nos. 4, 5, 7, 8, 11, 12, 13, 16, 18 & 21. Mr. Bebb observes that "the tendency of this species to produce a remarkable number of galls was observed by Muhlenberg, and he therefore called it S. conifera." Besides the above, I have also described a gall (No. 3) growing on S. rostrata, a northern species which does not occur so far south as Rock Island, and a coleopterous gall or rather pseudo-gall, (No. 22,) which grows on S. longifolia, and also, so far as can be judged from the gall alone, on a species of the allied genus Populus, P. angulata the common cottonwood. In addition to the five species of willow catalogued above, I noticed in the woods a single large tree of what I believe is a sixth distinct species, but too late in the season to obtain specimens of the inflorescence. From the foliage and a portion of the fruit forwarded to Mr. Bebb, he decides that it must be either S. nigra, which I am pretty sure it is not, or some foreign species. Since however this tree bore no galls whatever, the question, in an entomological point of view, is of no manner of interest, except so far as it may illustrate what I rather believe to be a general law, that exotic willows bear no galls. So far as my very limited observation goes, exotic Willows (S. babylonica and S. alba) bear no galls at all; which is collateral proof of the theory, that generally each distinct gall is peculiar to a distinct species of Willow, for if it had been otherwise, the indigenous gall-makers would have immediately attacked them when they were imported.

Of the above twenty-one galls, excluding the Coleopterous pseudo-gall and the doubtful galls on S. discolor and S. cordata, twelve (Nos. 1–15) are made by Dipterous insects belonging to the family *Cecidomyidæ*, and six (Nos. 16—21) by Hymenopterous insects belonging to the family *Tenthredinidæ*. In addition to a great number of insects which occasionally inhabit these galls, there are of true Inquilines which seem to inhabit them exclusively, but without always confining themselves to one particular species of gall, seven cecidomyidous species, two tenthredinidous species, and at least one and probably four or five Coleoptera, besides seven species of Microlepidoptera, which Dr. Clemens has kindly undertaken to name and describe from specimens with which I have furnished him. Each of the above, with the exception of the last, will be noticed below under the head of the Order to which it belongs.

From the great number of these Inquilines, it must be obvious that there is considerable danger of mistaking them for the true authors of the gall. For example, any one who examines the Tenthredinidous gall *S. pomum* n sp. in the middle of the summer, will find nearly half of them to contain *Anthonomus scutellatus* Schönh. either in the larva, pupa or imago state, unaccompanied by any Tenthredinidous larva; whence, as I myself formerly did, he would be very likely to jump to the conclusion that it was that insect that made the gall. A more extensive knowledge, however, of the galls of the willow will soon show him, that this same beetle occurs in great numbers in several other galls, some of them of a totally different structure; and hence he will properly infer that the same insect cannot make two totally different kinds of gall, and consequently that it must be a mere inquiline in *S. pomum*. There is another criterion which will be found very useful in determining the question, which of two insects bred from a given gall is the true Gall-maker and which the Inquiline. In all monothalamous galls, whether Cecidomyidous or Cynipidous, there is always a central cell or nucleus, in which the gall-maker resides, the inquilines either residing outside the central cell, or, as I believe to be often the case, and as must be the case with the Snout-beetle just now referred to, destroying the tenant of the central cell and occupying his place. If then non-parasitic pupæ taken from the central cell of a gall are isolated in one vial, and non-parasitic pupæ taken from outside the central cell are isolated in another vial, and the former always produce the imago A, and the latter always produce the imago B, it must be evident that A is in all probability the gall-maker and B beyond all doubt an inquiline. In this manner I ascertained that the pine-cone like gall *S. strobiloides* O. S. is not made by the cecidomyidous larva, which was observed by Osten Sacken to live in great numbers under the scales of the pine-cone, but by a distinct and much larger *Cecidomyia*, hitherto unobserved, which inhabits the very heart or centre of the pine-cone, the smaller *Cecidomyia* being mere inquilines. (See Osten Sacken apud Loew, *Synops. Dipt. N. A.* p. 203.) We may also in some cases get useful hints on this subject from the structure of the gall itself. For instance, in many Tenthredinidous galls, e. g. *S. ovulum* n. sp., on laying them bare to their foundation, the slit cut by the saw of the mother insect may be plainly seen. Hence, even if, as I have actually done, we should breed a *Cecidomyia* from such a gall, we may know that it must be a mere inquiline, because the Cecidomyidous oviduct is not capable of cutting such a slit. Still, with every possible precaution, mistakes will sometimes be made, as to the character of the insect that really makes the gall. For example, because, from the gall *quercus pilulæ* Walsh, I had bred ♂ ♀ of an Inquilinous Cynipide, I jumped to the conclusion that the gall itself must be the work of some unknown Psenidous Cynipide. (*Proc. Ent. Soc. Phil.* II. pp. 481—2.) Whereas I have since become aware that it is the work of a Cecidomyia known at present only in the larva state, and that it had been briefly described, but not named, by Osten Sacken. (*Syn. Dipt. N. A.* p. 201.) No other instance is on record, as Baron Osten Sacken has obligingly informed me, of a true Cynipide being inquilinous in a Cecidomyidous gall.

Some groups of insects that are commonly inquilinous in galls have no true gall-making insects belonging to the same family as they do, of which case I believe that we find an example in the Coleopterous *Curculionidæ*. (See below under No. 15.) But the great majority of them, e. g. the inquilinous Gall-flies, the inquilinous Saw-flies, and the inquilinous Gall-gnats, have many true gall-making species belonging, not only to the same family, but in the case of the Gall-gnats and Saw-flies even to the same genera, viz. *Cecidomyia* and *Nematus*, that they themselves belong to. Hence an observation of Osten Sacken's with regard more especially to the Gall-flies, which I formerly quoted and relied on. that "it seems hardly probable that species of the same genus should sometimes be true Gall-producers and sometimes Parasites [i. e. inquilines]" must be taken *cum grano salis* so far as it may apply to the Gall-gnats and Saw-flies, though it seems perfectly correct as limited to the Gall-flies. (*Proc. Ent. Soc. Phil.* I. p. 49.) What is very remarkable about these inquilinous insects, which have true gall-makers closely allied to them, is that they do not invariably confine themselves to the galls of their allies, but occasionally inhabit galls made by insects that even belong to different Orders. For example, the Cecidomyidous gall *Q. pilulæ* Walsh, as was just now stated, is inhabited by a Cynipide, Ceroptres* (amblynotus) inermis Walsh, and conversely from the Cynipidous gall *Q. petiliocola* O. S., I bred July 11th two specimens of a *Lasioptera* (*Cecidomyidæ*) resembling somewhat *L. solidaginis* O. S. but perfectly distinct from that species. Again, numerous instances are given in this Paper, where Saw-flies are inquilinous in the galls of Gall-gnats, and Gall-gnats are inquilinous in the galls of Saw-flies, as may be readily seen from the lists of Inquilines under DIPTERA and HYMENOPTERA. But in all such cases this appears to be the exception and not the rule. It should be remembered, that the same gall is often inhabited by several different species of inquilines, sometimes belonging to widely distinct groups, as, for example, the Cynipidous gall *Q. petiolicola* O. S. is inhabited not only by the Guest Gall-gnat mentioned above, but by a Guest Gall-fly, *Ceroptres* (*amblynotus*) *petiolicola* O. S.; (*Proc. Ent. Soc. Phil.* I. p. 67 and II. p. 487,) and that many species of these Guests habitually live in the galls of several different species of Hosts, many instances of which will be found below. It is even occasionally the case, that one and the same species is sometimes inquilinous in the galls of other insects, and sometimes attacks natural substances which are in nowise connected with galls, of which one instance is apparently found in the Dipterous *Drosophila amœna* Lw., and another notable one occurs in the common Curculio (*Conotrachelus nenuphar* Hbst.), one brood of which attacks the fleshy part of the Plum, Peach, &c., and another brood habitually lives in what will be shown below, to be in all probability a true Cecidomyidous gall—the well-known "Black-knot" on the Plum-tree. (See under No. 15.)

Nothing gives us a better idea of the prodigious exuberance of Insect Life, and of the manner in which one insect is often dependent upon another for its very existence, than to count up the species which haunt, either habitually or occasionally, one of these Willow-galls, and live either upon the substance of the gall itself or upon the bodies of other insects that live upon the substance of the gall. In the single gall *S. brassicoides* n. sp. there dwell the Cecidomyia which is the maker of the gall—four inquilinous Cecidomyia—an inquilinous saw-fly (Hymenoptera)—five distinct species of Microlepidoptera, some feeding on the external leaves of the gall, and some burrowing into the heart of the cabbage, but scarcely ever penetrating into the central cell, so as to destroy the larva that provides them with food and lodging—two or three Coleoptera—a Psocus (Pseudoneuroptera)—a Heteropterous insect found abundantly in several other willow-galls—an Aphis which is also found on the leaves of the willow, but peculiarly affects this gall—and preying on the Aphides the larva of a Chrysopa (Neuroptera) and the larva of a Syrphide (Diptera)—besides four or five species of Chalcididæ, one Braconide Ichneumon (Hymenoptera) and one Tachinide (Diptera), which prey on the Cecidomyia and the Microlepidoptèra—making altogether about two dozen distinct species and representing every one of the eight Orders, if with Sieboldt, Erichson and Hagen we refer Pseudoneuroptera to Orthoptera. If this one little gall and the insect that produces it were swept out of existence, how the whole world of insects would be convulsed as by an earthquake! How many species would be compelled to resort for food to other sources, thereby grievously disarranging the due balance of Insect Life! How many others would probably perish from off the face of the earth, or be greatly reduced in numbers! Yet to the eye of the common observer this gall is nothing but an unmeaning mass of leaves, of the origin and history of which he knows nothing and cares nothing!

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* Baron Osten Sacken tells me that he has learned from Dr. Rheinhardt of Germany, that the insects provisionally referred by him to Hartig's imperfectly defined genus *Amblynotus* belong in reality to Hartig's genus *Ceroptres*, or at all events must form a new genus closely allied to *Ceroptres*.

The Dervise in the Eastern Fable claimed to have discovered the language of birds, while to the vulgar their notes were mere inarticulate sounds without passion and without meaning. The Entomologist does not indeed pretend to understand the language of Insects, for, as they all breathe through spiracles or branchiæ, their mouths are everlastingly dumb. But from signs and tokens well known to him he can interpret their actions, and recognize at a glance what object they are pursuing, whether sport, or love, or war, or food for themselves, or food for their future progeny, or the construction of habitations either for themselves or for that future progeny which they are doomed never to behold. Under every stone, under every clod, and even under the most despised substances, there is a little world in miniature opened to his eyes. And there scarcely grows a plant but what contains, in Nature's own hieroglyphs, a whole volume of Natural History written by the finger of the Great Author of our being.

DIPTERA.—Family CECIDOMYIDÆ.

Many years ago, before the science of Entomology had any existence, the old herbalist Gerard, noticing a rose-like gall very abundant on a British species of willow, concluded that it was a purely vegetable production, and that the willow which bore it formed a distinct species, which he accordingly named "the Rose-willow"; and even Swammerdam, who ought to have known better, fell into the same error. (Kby & Sp. *Intr.* Letter 14, p. 254. Westw. *Intr.* II. p. 519.) Up to a very recent date, from some unaccountable cause, entomologists who recognized this gall as the work of insects, attributed it, not to a gall-gnat nor even to a saw-fly, but to a *Cynips.* (Kby & Sp. *ibid.*) Westwood, however, clearly recognizes the gall of the "Rose-willow" as the work of a *Cecidomyia*, (*Introd.* II. p. 519,) and I am indebted to Baron Osten Sacken for the following quotations from Dr. Hartig in reference to this matter. "There are no *Cynipidæ* on the willow, and the galls ascribed to *Cynips viminalis*, *C. capreæ*, *C. amerinæ* and *C. salicis strobili* belong either to *Cecidomyiæ* or *Aphides.*" (Germ. *Zeitsch.* II. p. 176.)—"I doubt very much whether other than parasitical Gall-flies [Figitidæ ?] occur on the willow." (*Ibid.* IV. p. 421.) To which it is added that "three species of *Xystus* (= the Figitide genus *Allotria*) are described by Hartig as being bred from the willow-gall of the Tenthredo *Nematus Vallisnierii.*"

As already stated, all the true Willow-galls I have so far met with are the work either of gall-gnats or of saw-flies, and none that I have seen are produced by *Aphidæ*, as seems to be asserted above of certain European willow-galls by Hartig. I once, indeed, found a colony of a species of Aphis, that inhabits S. cordata, surrounded by what at first sight looked like a large, subspherical gall; but on breaking it open I saw at once that it was the work of the attendant ants, and composed of particles of dry vegetable matter agglutinated together, in the manner described by Mr. Wm. Couper, (*Proc. Ent. Soc. Phil.* I. p. 373.) May it not be possible that the Willow-galls attributed to *Aphides* by Hartig are of a similar nature? Whenever a particular genus of plants, common to both N. A. and Europe, is infested by a particular genus of gall-making insects, it is generally the case that the same genus of Insects occurs upon the same genus of plants both in the Old and New World. Now if there really exist in the U. S. *Aphidæ* that produce galls on our willows, I can scarcely believe that they should have all managed to escape my notice. Still, like all other negative arguments, such reasoning as this is not entitled to much weight.

The genus *Cecidomyia* differs from most other genera of gall-producing insects, in that it occurs on very numerous and widely distinct genera of plants. In Osten Sacken's excellent Memoir on this Family, without the assistance of which I should not have ventured upon this Paper, N. A. *Cecidomyidæ*, many of them known only in the larva state, are enumerated as occurring on Hickories (Carya) of different kinds, on the red Maple (Acer), on the Ash (Fraxinus), on Oaks of different kinds (Quercus), on the Hornbeam (Carpinus), on the Tulip tree (Liriodendron), on the Willow (Salix), the Grape-vine (Vitis), the Locust (Robinia), the Alder (Alnus), the Gooseberry (Ribes), the Blackberry (Rubus), and the Pine (Pinus), besides Vaccinium, (or Gaylussacia?), Solidago, Impatiens, Agrostis, Chrysopsis, and the cereals wheat, rye, &c., (*Dipt. N. A.* 188—190.) Even the twelve N. A. species referred to the genus *Cecidomyia*, where the perfect insect is known as well as its larva, occur on eight distinct genera of plants. (*Ibid.*) What a contrast with *Cynips*, of which there are now about a score described N. A. species, all found on different species of Oak! We may observe, however, that as in the Cynips of the Oak, so also in the Cecidomyia of the Willow, it is a very general rule that the gall, when it grows on a twig, kills that twig unless it is pretty large, so that the presence of either of these two genera operates here as Nature's own pruning-knife.

But the most remarkable feature about the *Cecidomyidæ* is the generally dull, monotonous character of their coloration and ornamentation, the extreme similarity of many species, and the apparent identity of others, which we yet know, from the wide difference of the galls produced by them, must be distinct species. Hence Loew has remarked that "Gall-gnats cannot be recognizably described from single dried specimens, unless they are distinguished by some striking peculiarities;" (*Dipt. N. A.* p. 187;) and Osten Sacken observes as follows:—

> It is a peculiarity of the family of *Cecidomyidæ*, that its natural history has always been studied in close connection with its classification. This is owing chiefly to the fact that *the gall*, the produce of the insect in its first stage of life, is generally a more striking object in nature than the *insect itself*. The latter, small, tiny, difficult to preserve on account of their extreme delicacy, still more difficult to distinguish from their congeners on account of the uniformity of their appearance and coloring, would afford a very unsatisfactory object of study, unless in connection with the varied deformations which their larvæ produce on plants. (*Dipt. N. A.* p. 173.)

I find it utterly impossible in one case to distinguish from each other the dried ♀ imagos of two undoubtedly distinct species, which form distinct galls of a perfectly distinct structure on different parts of the same Willow, and the pupal integuments of which are structurally very distinct, viz. *Cec. s. rhodoides* n. sp. and *Cec. s. siliqua* n. sp.? I had hoped that, by taking descriptions of numerous specimens of recent *Cecidomyia*, and especially of the abdomen which often loses its coloration almost entirely when dried, some sharply-defined distinctive characters might be arrived at. But I have found from these descriptions that the same species, and even the same living individual of the same species, varies greatly in the coloration of the abdomen according to the degree of its maturity, and that what was at an early period in its existence yellowish or reddish, gradually becomes, in the course of a day or two, and sometimes even in the course of a few hours, brown or blackish. I have even repeatedly placed the recently killed ♀♀ produced from the above two galls side by side, and have found myself utterly unable to discover any constant distinctive character whatever, though it is barely possible that the structure of the ♂ antennæ may differ. In solitary individuals indeed it is easy enough sometimes to point out distinctive characters; but on comparing many individuals belonging to the same species, such characters are very generally found to be inconstant and worthless. Lest it should be assumed that the characters in my specimens might have been changed by chemicals, such as chloroform, &c., used to deprive them of life, it is proper to state here, that I kill all flies by simply immersing the vial or bottle, in which they are confined, into hot water up to the cork.

Under these circumstances the mind naturally reverts to the idea, that the difference in the gall is caused by the difference in its location, whether in the bud, or in the wood, or on the surface of the leaf, of the same species of willow, and that the two supposed distinct species of *Cecidomyia* are in reality identical. But on the very same species of Willow, S. humilis, there occur two galls, *S. rhodoides* n. sp. and *S. gnaphalioides* n. sp., differing indeed in size, but constructed upon precisely the same principle, both of them always solitary, both of them monothalamous, and both of them formed by a similar deformation of the terminal bud of a twig. Although each of these two galls may be recognized at the first glance, and no two galls can be more clearly distinguished by several sharply-defined characters without any intermediate grades connecting them, and I have examined hundreds of each to satisfy myself of their perfect distinctness, yet the ♀ imagos proceeding from these galls, and which are undoubtedly the authors of the galls, because the larva and pupa live in the central cell, and I have actually bred them from pupæ extracted from the central cell, are undistinguishable when placed side by side, except by a slight difference in size, though the average number and structure of the joints of the ♂ antenna may possibly be different. The larvæ, too, are alike even when placed side by side; the pupæ are precisely alike, even when placed side by side, and the only characters, that I can discover, to distinguish the two species are their size, their widely distinct galls, and the fact that the pupal cocoon of the first is about 2½—3 times as long as the mature larva, and the pupal cocoon of the second is from ½ as long again to twice as long as the mature larva. Whence we may draw the general conclusion, that in order to separate satisfactorily what are undoubtedly distinct species of *Cecidomyia*, it is necessary to study them, not only in the imago state, but also in all their preparatory states, and to describe the galls with the greatest precision.

On reviewing the value of the characters to be drawn from all these sources, with especial reference to the Gall-gnats of the Willow, which are the only ones that I have carefully studied, I have arrived at the following results:—1st. The egg in all species where I have observed it is uniform in shape, being constructed precisely as Osten Sacken describes it, but instead of being "orange-yellow or whitish" it is always sanguineous, (*Dipt. N. A.* p. 180.) Hence it appears that the egg does not vary in the same species in the Gall-gnats of the Willow, but on the other hand it does not differ in different species, except of course in its proportional size; so that it is of no service here towards distinguishing species. 2nd. The larva varies very considerably in its coloration, and becomes more deeply colored after it has reached maturity and formed its cocoon, as it approaches the period when it tranforms into the pupa state; but the "breast-bone" (See *Dipt. N. A.* p. 182,) is tolerably constant in the same species. Unfortunately, however, this last character does not differ materially, there being only two distinct forms, the Y-shaped, varying in the same species by a considerable curtailment or prolongation of the lower (or posterior) arm of the Y and the clove-shaped breast-bone. I thought at first that this curtailment or prolongation might be due to the greater or less degree in which the joint bearing the breast-bone is overlapped by the following joint; but on carefully examining at the same hour 26 larvæ belonging to 5 different but closely allied species, and distending the fore part of their bodies by pressure so as to obviate any such overlapping, I satisfied myself that it was a *bona fide* variation, and that it occurs in at least 4 out of the 5 species. The comparative length and breadth of the larva is somewhat inconstant; for although *C. s. siliqua* n. sp. (?) is always, so far as I have observed, (9 specimens) elongate, yet others (e. g. *C. s. brassicoides* n. sp. and *C. s. strobiloides* n. sp.) are generally short, but occasionally as elongate as *C. s. siliqua*. *3rd.* The pupa varies very considerably in coloration, becoming much darker before it transforms. On the other hand the coloration of the empty pupal integument is very constant, and presents a few very remarkable differences in different species, even when the pupæ themselves are undistinguishable in their coloration. The characters drawn from the structure of the horns at the base of the antennæ and the thoracic bristle (*ibid.* p. 185–6) are invariable, but do not differ much in different species, no less than five species being precisely identical in these respects. It is remarkable that I could not find in any species the bristle behind the base of the antenna, which is stated by Osten Sacken to occur in most Cecidomyide pupæ. *4th.* The structure, shape and comparative dimensions of the cocoon, which the larva of most species constructs in the autumn, and in which it lies through the winter, not transforming into the pupa till a few weeks before it is ready to assume the imago state in the following spring, afford some pretty good characters. Although there is nearly as much room for a long cocoon in the gall *S. brassicoides* as in the gall *S. strobiloides*, yet in the former the cocoon invariably envelops the larva so tightly that it is difficult to be detached, and in the latter it is invariably about long enough to hold three larvæ packed lengthways, the larva of this and other allied species being always found lying in the basal end of the cocoon with its head towards the empty tip. 5*th*. As already stated, the coloration of the imago varies astonishingly, not only in the dried, but also in the living specimen, as will be shown in detail in the case of almost every species where I have obtained the imago. In the case of the abdomen ♀, the more or less deep sanguineous color is due to the color of the included eggs showing more or less through the more or less transparent integument, as is also the egg-yellow color in the abdomen of many ♀ Ephemerina. (See my Paper *Proc. Ac. Nat. Sc. Phil.*, Sep. 1862, pp. 374, 375, 377.) When these eggs are partially extruded, it will be seen that in the inquilinous *Cec. albovittata* n. sp. the abdomen, instead of fulvous or sanguineous, becomes in the empty part luteous like the abdomen of the ♂. A precisely similar thing occurs in the abdomen of many ♀ Ephemerina. (*Ibid.*) In a few ♀ *Cecidomyia*, when dried—and I have noticed the same thing in many living ♀ ♀ —several eggs remain still attached to the oviduct, and I suspect that the "two small oval lamels," stated by Winnertz to be attached to the oviduct of the European *C.* (*diplosis*) *pini* DeG., are nothing but two eggs thus protruding. (*Dipt. N. A.* pp. 177–8.) On the other hand the color of the hairs of the thorax, but not of the abdomen, I find to be a constant character both in the living and the dried specimen, and to differ in some species; and the same is true of the arrangement of the hairs on the thorax, whether in rows or irregularly scattered. As regards other structural characters, the length of the oviduct varies greatly, according to the degree in which it is retracted, as has been observed by Say, (*Say's Works*, II. p. 5,) but the average length differs considerably in some few species. The number of joints in the ♂ antenna varies by 2, or 3, or perhaps even 4 joints in the same species, according to the general rule in Natural History, that multiple parts, like the vertebræ of a snake and the stamens of polyandrous flowers, are inconstant in number.* Specimens not unfrequently occur where the right and left antenna of the same individual ♂ vary by one joint, as has been noticed by Loew of *C. chrysopsidis* Lw. (*Dipt. N. A.* p. 204.) Similarly, the ♂ antenna of *C. solidaginis* Lw. is described by Loew, probably from only a few specimens, as 22 or 23-jointed, (2+20 or 2+21,) but in one ♂ which I bred myself of that species it is distinctly 20-jointed, (2+18,) thus showing a variation of 2 or 3 joints; and, according to Mr. Herrick, the number of joints in the antenna of the Hessian fly (*C. destructor* Say) varies from 16 to 19 or 2+14 to 2+17. (Harr. *Inj. Ins.* p. 570.) To avoid ambiguity, it may be stated here that in the Gall-gnats the long basal joint or *scapus* is counted as two joints, from the homology of allied families, though to the eye but one joint is discoverable. As to the joints of the ♀ antenna, I have found it impossible to count them with any precision either in the recent or the dried specimen, owing to their being so short and towards the tip so nearly cylindrical. On the other hand the structure of the ♂ antenna, as regards the comparative length of the pedicels and verticils, is very constant; but unfortunately it does not differ at all in the different species that form galls on our willows, though in other species, e. g. *C. solidaginis* Lw., it differs considerably; and the same may be said of the neuration, with the single exception of the structure of the anterior branch of the 3rd longitudinal vein, which differs a little in some few species, the differences being nearly constant. It may be worth while here to remind the student of the very necessary caution given by Osten Sacken, "not to mistake for a vein a longitudinal fold which generally exists between the 2nd and 3rd longitudinal veins." (*Dipt. N. A.* p. 175, note.) This fold is exceedingly puzzling at first, and seems to foreshadow the interpolated vein between the 2nd and 3rd longitudinals, which occurs either simple or forked in the second Section of *Cecidomyidæ, Anaretina*. Even Westwood has been apparently deceived by its simulating a vein so completely, for he figures it along with the true veins. (*Intr.* II. p. 518, fig. 3, and compare *Dipt. N. A.* p. 174, figs. 1—5.) The ♂ genitals may, and I think do, afford some good specific characters; but these characters are almost microscopic, difficult to describe without good figures, and become evanescent in the

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*Most Coleoptera have 11-jointed antennæ, and the number of joints is inva-

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riable; but in ♂ *Prionus imbricornis* Lin., which has an anomalously large number of antennal joints, the number varies, even in the right and left antenna of the same individual, from 18 to 19.

dried specimen. On the whole, I know scarcely a single group of Insects, not even excepting *Aphidæ*, where the imago affords so few good and reliable characters as in the *Cecidomyia* of the willow, which is the more provoking as the number of species is so considerable. *6th*. The galls most of them afford very good, constant, and definite characters, and as yet I have found no two galls undoubtedly distinct, that cannot be sharply and effectually separated, with the exception of the Tenthredinidous galls, *S. ovum* n. sp. and *S. ovulum* n. sp., which occur on two different willows.

Osten Sacken has said that all the larvæ of *Cecidomyidæ* have 13-jointed bodies, the supernumerary joint, which bears the breast-bone, being placed between the head and the 1st thoracic (stigma-bearing) segment; and that the number and position of the stigmata are normal, one pair on the 1st thoracic segment and eight pairs on the first eight abdominal segments. (*Dipt. N. A.* pp. 181–2.) I agree with Schaum, that, contrary to the opinion of Westwood, no insect in any of its states has, in reality, more than 12 joints to the body, i. e. 3 thoracic and 9 abdominal, and I can discern but 12 joints, exclusive of the head, in the larva of any of the *Cecidomyia* of the Willow, the first joint bearing the breast-bone on its inferior surface and dorsally rather short, the last composed of little else but two tubercles transversely arranged and directed backwards. And it appears to me, (though of this I would not be so certain,) that in a very elongate and large larva (*C. s. siliqua* n. sp.?) where the joints were unusually hunched and distinct, there was a pair of spiracles to every joint but the one that bears the breast-bone and the 12th or anal one, all arranged in a lateral row ⅓ of the way to the hind end of each joint. In any case there was certainly a pair of spiracles on what I consider as the 1st abdominal joint, but what, according to Osten Sacken, is the metathorax. In two or three other specimens belonging to the same species I was unable to see the spiracles so distinctly, but still I saw them.

Latreille, Audouin, Schaum, and many other European entomologists, have asserted that no insect in any of its states has any metathoracic spiracle. Loew, however, agrees with Westwood in considering the spiracle in front of the Dipterous halteres, which the above authors, most incongruously as it seems to me, maintain to be abdominal, as truly metathoracic. (*Dipt. N. A.* Intr. p. xiv.) In the larvæ of insects which have a quiescent pupa, it is undoubtedly the general rule, that they have only one pair of thoracic spiracles, which is situated on the prothorax, or immediately behind it, or sometimes on the anterior part of the mesothorax (*Elateridæ.*) But still there are plenty of them which have both meso- and meta-thoracic spiracles. As I purpose entering fully on this and certain allied subjects in a future Paper, it will be sufficient to refer here, in confirmation of this last point, to Westw. *Introd.* I. p. 67, fig. 8, and compare p. 68; p. 255. II. p. 239. fig. 5; p. 252; p. 263, fig. 9; p. 267, fig. 15.

Osten Sacken has said, that "the use and homology of the breast-bone is unknown," and suggests that it may possibly represent the mentum of the larva of *Tipulariæ.* (*Dipt. N. A.* p. 182.) Say, from his description of this part in the larva of *Cec. destructor*, appears to have considered it as a pair of rudimentary legs, which it can scarcely be, because it is one solid piece; and besides, there is no instance in Insecta of the development of only a single pair, or of only two pair of legs, though in the larva of *Passalus* (Coleoptera) the hind pair of legs are greatly reduced in size, and functionally impotent,* and in the imagos of many Butterflies the same thing occurs in the front legs. (*Say's Works*, II. p. 5.) From the fact that in many species, especially those where it assumes a Y-shaped form, it is manifestly overlaid by the transparent integument of the insect, as may be seen from viewing it in different lights, I infer that it is not any part of the external skeleton, and cannot, therefore, be homologous with the central piece of the sternum in the imago, or the mentum in the larva of *Tipulariæ;* and that it must consequently be the homologue of some internal organ, perhaps the "antecoxal plates" of Coleoptera. (Lec. *Intr. Col.* p. xv.) From the fact stated by Osten Sacken, and which I can confirm from my own observation, that this organ is peculiar to the larva of *Cecidomyidæ*, and from the further facts that its anterior extremity, as stated by the same author, either bears one or two thorns or is serrated, &c., (*Dipt. N. A.* p. 182,) and that when the head is retracted, as is usual in the

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*I state this of my own knowledge of *P. cornutus* Fabr. A larva of *Passalus* was represented with only four legs by Abbot, apparently from overlooking the hind legs, which are decussated on the sternum and not very obvious. (See Westw. *Intr.* I. p. 189.)

quiescent specimen, it projects a little from the anterior extremity of the body, I infer that its use is to abrade the interior of the gall, and, by the irritation thereby produced, promote the growth of the gall and cause a flow of sap which is to form the food of the larva. As no solid fæces are found in the cells of Cecidomyidous larvæ, it is evident that those larvæ cannot devour the solid substance of the gall, and their mouths seem entirely too soft and membranous to produce any material abrasion in the interior of some of the more woody galls e. g. *S. siliqua*. In confirmation of the above idea, it may be stated that I found in November a single larva of *C. s. strobiloides* n. sp., with one of the thorns of its Y-shaped breast-bone absent, and apparently broken off short at the bifurcation. The breast-bone can scarcely be used for locomotive purposes, as Osten Sacken doubtingly suggests; for if it were, we should surely find it in other Dipterous larvæ besides those of the Gall-gnats. Whatever be its use, it must be something specially connected with the habits of the Gall-gnats, otherwise we should find it elsewhere. In the larva of another widely distinct Dipterous gall-maker, *Trypeta solidaginis* Fitch, there exists no such organ, but the mouth terminates in a robust, horny, black, emarginate piece, which probably subserves the same purpose that I believe to be subserved by the breast-bone of the larva of the Gall-gnats.

As to the pupal cocoon of *Cecidomyia*, Winnertz, as quoted by Osten Sacken, "positively denies that the larvæ *spin* this cocoon; according to his observation, the latter is, so to say, *exuded* by the larva. He found that larvæ, which had fastened themselves to a leaf, were encircled within twenty-four hours by a white halo, consisting of tiny, thread-like particles, which seemed to grow somewhat like crystal-needles; the larva during this time remained perfectly motionless. The cocoon is perfected within a few days, and even then, under a strong magnifying power, no genuine thread is perceptible." (*Dipt. N. A.* p 184.) I believe that it is in this manner that the pupal cocoon of ALL *Cecidomyia* is formed, i. e. that it is not spun by the larva, but secreted in a glutinous form from the general surface of its body. I have observed that the thin, filmy cocoon of such species of Willow Gall-gnats, as reside in a gall composed internally of the closely appressed and overlapping leaves of the deformed bud, (*C. s. brassicoides* n. sp., *C. s. strobiloides* n. sp., *C. s. rhodoides* n. sp. and *C. s. gnaphalioides* n. sp.) is almost always indissolubly agglutinated, especially towards its base, where the external air has not so much chance to dry it, to one or more of the small linear-lanceolate leaves that form the interior of the gall. I have also observed that the cell in which the immature larva of *C. s. batatas* n. sp. resides—the gall itself being composed of a homogeneous, rather compact, spongy substance—is (July 30) rough, opaque and scaly on its internal surface, while the cell of the mature larva for many months before it assumes the pupa state (November 11 and subsequently) is glabrous and polished, without any distinct cocoon as in the other species. To what can we attribute this change, but to the exudation of some glutinous substance by the larva, with which it, as it were, plasters the rough walls of its house? If the cocoon of *Cecidomyia* was always spun by the mouth of the larva, as most hymenopterous and lepidopterous cocoons are constructed, it would surely here assume the ordinary form of such cocoons when spun inside the walls of a cell, i. e. an integument distinct from the walls of the cell; whereas the smooth internal surface of the cell is intimately united to the original rough surface, and can no more be detached from it than the finishing coat of plaster can be detached from the first rough coat. I have observed a similar smooth lining to the cell-walls of *Lasioptera solidaginis* O. S., which, like those of *C. s. batatas*, are surrounded by brown sponge. As a proof that the smooth internal surface of the gall-cell of *C. s. batatas* is homologous with the filmy cocoon of *C. s. brassicoides*, &c., we find in *C. s. siliqua* and *C. s. cornu* n. sp. an intermediate grade between the two, viz: the central and generally the lower portion of the cocoon almost indissolubly plastered on to the smooth walls of the cell, and the upper and sometimes also the lower end forming a thin, filmy diaphragm, of precisely the same texture as the entire cocoon of *C. s. brassicoides*, &c., across the mouth and sometimes the lower end also of the cell.

From not sufficiently attending to the peculiar nature of the above process, some authors have supposed that the pupal cocoon or "flaxseed" envelop of the Hessian fly (*Cec. destructor* Say) was nothing but the indurated "skin" of the larva, i. e. that a Nemocerous Dipteron had a coarctate metamorphosis like a Notacanthous or an Athericerous Dipteron! (See Harris *Inj. Ins.* pp. 575–7, and Fitch as quoted at length by Osten Sacken, *Dipt. N. A.* p. 204.) But both Harris, and Westwood, and several other authors, expressly state that, when the "flax-seed" envelop is carefully opened, the included insect will be seen to be still in the larva state. (Harris, *Ibid; Dipt. N. A.* p. 185; Westw. *Intr.* II. p. 529.) Now how is it possible for the "flax-seed" envelop to be composed of the external integument, or "skin," if you choose to call it by that name, of the larva, when that larva exists in its normal condition inside the "flax-seed" envelop? To believe this, we must believe that the larva moults twice over to pass into the pupa, once to form its pupal envelop, and once to pass into the pupa state, which is contrary to all analogy. Of one thing I am, at all events, quite certain, viz: that with the Gall-gnats of the Willow it is impossible that the cocoon can be formed of the external integument of the larva; for, not only is there an utter absence of the transverse sutures which we find in all coarctate pupæ, representing the sutures between the joints of the larva, but in several species the cocoon is 2—4 times as long as the body of the larva when that body is stretched out to its fullest extent. Moreover in two specimens of the gall *S. siliqua*, (see below No. 8,) I found *two* cocoons, one inside the other; so that if the cocoon of this species is always formed of the larval integument, the larva must, in these two cases, have moulted *twice over* to form its two cocoons; which is absurd. Osten Sacken observes that "the larva of *C. pini inopis* O. S. fastens itself to a pine leaf, and remains motionless until the resinous substance, which it exudes abundantly, begins to harden; the larva then gradually frees itself from the contact of the cocoon-like case thus formed" (*Dipt. N. A.* p. 185.) These observations are in complete harmony with the theory of Winnertz, quoted above; but when Osten Sacken adds that "it is very probable that this cocoon is nothing but the outer larva-skin, saturated with resin," I think he has been inadvertently led into error by the theories of Harris and Fitch.

I am also very skeptical as to certain assertions of Harris and Fitch, that the larva of *Cecidomyia* transforms *gradually* into the pupa state, by a kind of budding process, without moulting the larval integument, instead of *suddenly* moulting into the pupa state, as in all other insects. This theory seems to have been devised in order to harmonize with the erroneous hypothesis already referred to, (viz: that the cocoon of the Hessian fly is made out of the external integument of the larva,) and so prevent the necessity of assuming that the larva moulted twice over to pass into the pupa state. (See Harr. *Inj. Ins.* p. 577.) Thus, perhaps, as often happens, one mistake has given birth to another, and in stopping one leak another has been opened. In the larva of the Gall-gnats there are, of course, no legs. In the pupa the legs extend to the tip of the abdomen, or even beyond it, and both legs and antennæ, as is well known to be the case with all other Nemocerous Diptera, are perfectly free and detached from the body. From repeated experiments, I know that, in the case of the Willow gall-gnats, the pupa remains in this state for a week and over, without the legs or antennæ becoming any longer, before it transforms into the imago. It is likely enough, indeed, that the legs and antennæ of the future pupa may become partially visible under the very thin, delicate, and semi-transparent integument of the larva, shortly before that integument is moulted; but still they will not then be *free*, as in the true pupa, neither will the insect be as yet in the pupa state, properly so called, for that very reason. I believe that it was from not attending to the distinction between *obtected* legs and antennæ, and *free* legs and antennæ, in two radically distinct states of the Gall-gnat, viz: the very mature larva and the true pupa states, that the above quoted assertions took their origin. I have probably examined at different times considerably over a thousand specimens of Willow Gall-gnats, some in the larva and some in the pupa state, and I always found them *either in one state or the other.* Whereas if, as Harris and Fitch assert with especial reference to a Willow Gall-gnat, the change from the larva to the pupa state was *gradually and slowly* effected, as a newly-hatched chicken gradually and slowly exchanges its hairs for feathers, I certainly must have met with at least a few specimens *in the transition state*, i. e. with legs and antennæ free but only ¼ or ½ or ¾ as long as in the normal pupa. Authors are perpetually forgetting, that Annulate animals pass from one state to another only by suddenly moulting their skeletons, while Vertebrate animals retain the same skeleton throughout, and pass from one state to another by the slow and gradual accretion of new matter. Osten Sacken incidentally remarks that the facts referred to above are "not mentioned in the European authors." (See on this subject *Dipt. N. A.* pp. 184—5; Harris *Inj. Ins.* pp. 566—7.)

Perhaps few things have contributed so much towards propagating erroneous views on such subjects as these, as the almost universal use of the term "skin" as applied to the external integument of Insects, especially when in their softer larval and pupal states. Hence the mind is insensibly led to suppose that there is a homology between this so-called "skin" and the true skin of the Vertebrate animals; and that the difference, for example, between the hard shell of a Coleopterous imago and the soft skin of a frog, is the same as that between the hard shell of a Coleopterous imago and the comparatively soft shell or so-called "skin" of its larva and pupa, or that between the hard shell of a tortoise or an armadillo and the soft skin of a frog or an ourang outang. Whereas the tortoise and the armadillo, equally with the frog and the ourang outang, have a distinct skeleton, to which most of their muscles are attached as in other Vertebrata, *inside* their external integument, which is, therefore, in the case of the two former animals, a true, shelly, indurated skin; while no Coleopterous imago, or pupa, or larva, or any other Annulate animal, in any of its states, has any such skeleton, all its muscles being attached to the external integument, no matter whether it is hard or soft, or of an intermediate texture, which is therefore not a true skin but a mere naked, external skeleton, protected by no skin, because, unlike the soft external muscles of the Vertebrata, it does not require any such protection. "Articulorum nexibus," says the great Father of modern Scientific Entomology, speaking more particularly of Crustacea, "*externis*, nec productione *cutis* (ut in mammalibus, avibus) tectis." (Latr. *Gen. Cr. et. Ins.* I. p. 5.) No one can look at the claw-bearing legs of a crab or a lobster, or the knee-joints of the hind legs of a Cricket or Grasshopper, without being struck by the great similarity of the articulations to those which we commonly find in the skeletons of Vertebrata. Hence the miser that proposed to "skin a flea for its hide and fat" proposed a physical impossibility; for no flea, or any other Annulate animal, has got *any hide at all.* More fortunate than the Student of Vertebrata, the Entomologist is not compelled to go through the tedious process, with his specimens, of dissecting away the skin and the muscles, boiling down the bones, and then putting them together again by artificial appliances, before he can get a complete view of the skeleton of the animal which he is studying; but Nature furnishes him with *his* skeletons in the most bountiful profusion, unconcealed by extraneous substances, and already set up and put together, the separate bones all fastened in their proper places by their natural membranous connections, and every part perfect and uninjured. It is by a careful study of what is truly and correctly speaking the Skeleton of Insects, (so far as any part or organ in one Animal Sub-kingdom can be homologous and homonymous with a similar part performing similar functions in another Animal Sub-kingdom,) and of the various confluences, connations, arrangements and shapes of the bones, or "pieces," as they are commonly called, that compose it, that most of the modern improvements in the Classification of Insects have been perfected.

The question naturally recurs here, how, having by the process described above secreted this glutinous substance from the general surface of its body, the larva of *Cecidomyia* contrives to detach itself from it, so as to construct a true cocoon, enveloping its body, but not agglutinated to that body. Winnertz declares that his larvæ remained perfectly motionless during the process of the formation of their cocoon. The larva, therefore, can scarcely become detached from the glutinous matter by wriggling its body round and round, even if we could explain how an insect, by wriggling round in a drop of tar, could form of that tar a more or less thin pellicle, enveloping, but not agglutinated to itself. From the careful study of the phenomena presented by the cocoons of the Willow Gall-gnats, I have arrived at the conclusion, that after secreting the glutinous matter from the general surface of their bodies, they must then discharge something of a gaseous nature, probably from the same pores which secreted the glutinous matter, so as to detach the adhesive material from their external integument and blow it up into a kind of bubble. We know that the imago of the Coleopterous *Brachinus* has the power of discharging a very acrid gas from its anus, and that most plant-feeding Heteroptera in all their states discharge a fetid gas from a large opening like a spiracle on the inferior surface of their bodies. When in a particular species of *Cecidomyia* the quantity of gas is small, then the cocoon is small, and fits pretty closely to the body of the larva, as in the well-known Hessian fly and *Cec. s. brassicoides* n. sp. When on the other hand, in another species, the quantity of gas is large, then the cocoon is large as in *Cec. s. strobiloides* n. sp. and its allies. When it is so large that it retains sufficient expansive force to press the cocoon firmly against the walls of the cell, and those walls are adapted to adhere to a glutinous substance, then the cocoon is firmly agglutinated to them, except at the elongate, slender tip of the cell, where, the air having free access to it, it dries rapidly, so as to form a subterminal diaphragm across the mouth of the cell, as in *C. s. siliqua* n. sp. and *C. s. cornu* n. sp. When its expansive force is lost before the walls of the cell are reached, or when the walls of the cell are not adapted to adhere to a glutinous substance, or when, from the free admission of air, the glutinous matter dries too rapidly to have time to adhere, then the cocoon remains separate and distinct from the walls of the cell, as in *C. s. triticoides* n. sp., or adheres to it only here and there, as in *C. s. strobiloides*, &c. The fact just now referred to of there being a *double* diaphragm formed by the thin pellicle of the cocoon at *both* ends of the cell in two specimens of the gall *S. siliqua* found on S. cordata, seemed at first sight opposed to the above hypothesis; but we may get over the difficulty by supposing some abnormal affection of the larva, so that its gas began to be discharged before it had done secreting its glutinous matter, and that it thus formed two cocoons one after the other, and one inside the other. In any case, no matter how the cocoon was formed, there must have been here two separate cocoons formed one after the other, and one within the other; and the fact of the exterior one of the two not having extended to the base of the cell, as it invariably did in scores of other specimens examined by me, proves that when it was formed there must have been a scant supply of material. On the whole, it is impossible to look at the thin, filmy cocoons of *C. s. strobiloides* and its allies, which are not thicker here and thinner there, but of one uniform, homogeneous thinness, without being impressed by the idea that they are mere bubbles, blown by some wonderful and hitherto undreamt of process within the lanceolate cell in which the animal resides. A larva might spin such a homogeneous cocoon with its mouth, as many Hymenopterous cocoons of nearly as great tenuity and equally homogeneous are spun, e. g. that of *Pelopæus lunatus* Fabr.; but it is, I think, proved that the cocoon of the Gall-gnats is exuded and not spun. It must, therefore, be either blown like a bubble or be daubed on the walls of the cell by the body of the insect. But no mere smearing and daubing process could spread that mortar in such a regular manner, as to be precisely of the same tenuity, where it forms a diaphragm across the upper end of the lanceolate cell, as in *C. s. strobiloides*, &c., that it maintains everywhere else. Consequently it must be blown like a bubble.

Be this as it may, one thing is quite clear. It is impossible that, in one and the same genus of insects, some species, as Harris believed, should spin a silken cocoon and transform into the pupa state inside that cocoon, without moulting any larval integument, by a certain anomalous budding process, and that other species should spin no cocoon, become detached from the larval integument without ceasing to be still larvæ, and then transform inside that detached larval integument by the same budding process as the others. It is undoubtedly true, for I have verified the fact myself, that some *Coccinellidæ* transform to pupa inside the larval integument, and some moult it in the normal manner; this is anomalous enough, but it is not so utterly anomalous as the Harrisian theory.* But the climax is reached, when it is proved by the observations of Winnertz and Osten Sacken, that several other species of the same genus *exude* their cocoons from the general surface of their bodies, thus giving three totally different methods of forming the pupal envelop in the same genus—spinning, moulting and exuding!!! It is very true that the pupal envelop, in the Hessian Fly and in the Gall-gnats that exude their cocoons, is much more dense and leathery than in the Gall-gnats of the Willow and in the Wheat-midge; but that is merely a question of mode and degree, not of principle, and is probably due to the fact, that in the Gall-gnats of the Willow the pupa is completely protected by a dense mass either of wood or leaves, and does not therefore require a robust cocoon, while the Wheat-midge ordinarily goes under ground to assume the pupa state, though a few transform in the ear of the wheat. That the pupal envelop of all *Cecidomyia* is formed in the same way, and that the resinous envelop of *C. pini inopis* O. S. and of the *Cecidomyia* referred to by Winnertz is strictly homologous with the "flax-seed" envelop of the Hessian fly, and both of them strictly homologous with the smooth lining of the cell-walls of *C. s. batatas* n. sp. and the thin, filmy cocoon of the Wheat-midge, (*Cec. tritici*,) and of several of the Gall-gnats of the Willow, I have no manner of doubt. Now we know that in the first case the pupal cocoon is exuded. Whence it is but rational to believe, in opposition to the theories of Harris and Fitch, that in all the other cases the pupal envelop is likewise exuded, and not spun nor formed out of the moulted integument of the larva.

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* In *Chilocorus*, as stated by Westwood and as I have myself observed in *C. bivulnerus* Muls., the larval integument is retained *whole* by the pupa; in the European *Coccinella Argus* it is retained, but *widely split open along the back*, thus showing an intermediate grade between the anomalous transformation of *Chilocorus* and the normal transformation of most other *Coccinellidæ*. (Westw. *Intr.* pp. 397—8.) But there can be no possible intermediate grade between a cocoon spun by the mouth of a larva, and the puparium of a true coarctate pupa, which is formed out of the indurated integument of the larva, the two things being radically and fundamentally distinct. In *Anthrenus* (*Dermestidæ*), which also retains the larval integument when it transforms to pupa, there is a similar slit made along the back of it; but whether this is also the case in other Dermestide genera which retain the larval integument when they transform to pupa, (*Megatoma* and *Tiresias*,) is not stated. (See Westw. *Intr.* pp. 159, 161.)

As to the Natural History of the Wheat-midge, when that insect, as is occasionally the case, transforms to pupa in the ear of the wheat, it forms a thin, filmy cocoon and generally transforms to imago the same season. (Marsham and Kirby, quoted Harris *Inj. Ins.* p. 589.) Those that go underground to transform must undoubtedly also form a cocoon; and from the analogy of the Willow Gall-gnats we may conclude, that they ordinarily lie in the cocoon in the larva state all through the winter, and at least until the commencement of the following spring, the imago appearing in June and July, and the imago of most of the Willow Gall-gnats appearing as early as April and May. There is a similar variation in the habits of the European Willow Gall-gnat, *C. terminalis* Lw., which, according to Winnertz, "sometimes goes under ground, and sometimes transforms within the willow leaves deformed by it." (*Dipt. N. A.* p. 184.) Harris, singularly enough, while he holds that the thin, delicate cocoon of the only Willow Gall-gnat known to him is *spun* by that insect, maintains, contrary to the opinion of Kirby and my departed botanical friend, Prof. Henslow of Cambridge, England, that the similarly thin and delicate cocoon of the Wheat-midge is, equally with the dense, leathery cocoon of the Hessian Fly, composed of "the outer skin of the larva." (*Inj. Ins.* pp. 590, 596.) He appears to have been led into this belief, in regard both to the Hessian Fly and the Wheat-midge, from observing in the cocoon of both of them faint indications of the same transverse sutures that we see in the coarctate pupa of *Stratiomys* and *Musca*. (*Ibid.* pp. 576, 595.) Such phenomena are easily explainable on the theory of the cocoon being *exuded*, but he very justly considered that they were opposed to the theory of the cocoon being *spun*. Having once become firmly possessed by this notion, he implicitly accepts and adopts the statement of a lady, that she saw "many of the *maggots* [of the wheat-midge] in the very act of emerging from their skins" [cocoons], and makes confusion worse confounded, by maintaining that the larva of that insect first of all constructs a house for itself by sloughing off its entire "skin" like the Hessian Fly, and then, unlike the Hessian Fly, crawls out of that house and goes underground naked to transform to pupa! (*Ibid.* pp. 595—8.) It must have been, not the *maggot* (larva), but the *pupa*, that the lady saw emerging in the summer from what she called its "skin," but what is in reality its cocoon, thin and filmy indeed, but no more so than those of the Willow Gall-gnats, and enveloping the larva closely as in *C. s. brassicoides.* (Marsh. and Kby.) And the "silvery coverings glistening in the sunshine on the ears of the wheat" so graphically described by the same lady, (*ibid.* p. 597,) are manifestly not the "*skins*," as Harris believed, of the larvæ that had gone underground for the winter, but the *cocoons* of the comparatively few individuals that remain throughout in the ear of the wheat and *transform to imago the same season;* as observed by Marsham and Kirby, and as occurs in many insects belonging to other Orders, e. g. the Canker-worm (*Anisopteryx vernata* Peck) and *Acronycta oblinita* Guén. (Walsh, *Trans. Ill. St. Agr. Soc.* IV. p. 358.) In scientific matters, to get at the truth from amidst the confused and contradictory evidence of non-scientific observers, often requires the abilities of a first-class Philadelphia lawyer. Harris, indeed, states, as of his own knowledge, that "not the slightest vestige of the larva-skin [cocoon] was found in the earth in which some of these insects had undergone their transformations," and that "the pupa is entirely naked." (*Ibid.* pp. 597–8.) But this may be readily accounted for on the hypothesis, that when the larva goes underground the excessively thin cocoon, being glutinous when it is newly exuded and not drying rapidly in the moist earth, adheres strongly and becomes indissolubly agglutinated to the dense medium that surrounds it, as does the cocoon of *C. s. batatas* n. sp. to the surrounding moist, dense, spongy matter of the gall of that insect; whereas, when the same cocoon is exuded by the same larva among the loose chaff of the wheat-ear, it dries rapidly and is not so agglutinated. It has been already stated that in *C. s. cornu* n. sp. and *C. s. siliqua* n. sp.? part of the thin, filmy cocoon adheres strongly to the surrounding medium and part does not.

There is a very prevalent idea in the Agricultural community, that all that is required, in order to devise remedies for the depredations of any given Noxious Insect, is to investigate the Natural History of that one given Insect. The cases of the Hessian Fly and the Wheat Midge —two insects which annually damage the people of the United States to the extent of at least a hundred million dollars—prove, I think, satisfactorily, that it is impossible completely to unravel the intricacies of the Natural History of certain Noxious Insects, unless we first become well acquainted with the Natural History of their congeners. As well might we attempt to delineate the path of a Comet, without first becoming acquainted with the laws that regulate and control the whole Solar System. Without such collateral knowledge, we shall sometimes—instead of recognizing that UNITY OF HABITS in every genus, which is the very essence of the thing that we call a Genus, because Habits are correlated with Structure, and Structure makes the Genus—become prone to believe in the existence of several fundamentally different and heterogeneous habits in one and the same genus, we shall be liable to accept as indisputably true the most absurd and contradictory and anomalous statements from others, and we shall ourselves be led into errors and hallucinations without number, and in these minute objects be occasionally deceived by optical illusions and phenomena which exist only in the imagination.

"The observer," says Osten Sacken, "must see well and *render only what he has seen;* a condition much more difficult to comply with, in matters of Natural History especially, than is usually imagined." (*Proc. Ent. Soc. Phil.* I. p. 47.) "It is well," says the English conchologist, Dr. P. P. Carpenter, "in the present state of science, to TAKE NOTHING ON TRUST. What is copied from book to book, and what is repeated from figure to figure, may be correct; but then on the other hand it may not. * * It is curious how large a proportion of existing observations on Mollusks need verification by those who have honest, well-trained eyes. Just as the infant's eye has to be trained to distinguish forms and distances, so it requires practice, before we know how to see truly an object that lies before us. During the educational process, *it is often very easy to see what we wish or expect to see.*" (*Rep. Smithson. Inst.* 1860, pp. 280, 231.) If, then, error is as rife in Science as the above observations would lead us to suppose, surely the refutation of Old Error is at least as important an occupation for the naturalist as the exposition of New Truth. Otherwise, if we all busy ourselves in the publication of what each of us considers as new truths, and nobody takes the pains to winnow away the falsehoods from the enormous mass of observations accumulated by his predecessors, Science soon becomes a mere heap of chaff with only a few kernels of wheat mixed in amongst it. I know no entomologist, living or dead, who has not made some grievous mistakes; and I candidly confess that I have myself made several most inexcusable ones. The difference between the pretentious charlatan and the truly scientific entomologist is, that the former claims to be infallible and invariably gets angry when his errors are refuted and corrected; the latter always acknowledges and corrects his own errors when he is fortunate enough to discover them himself, and is thankful to any one else who will take the trouble to correct them for him. The former writes and talks for victory and not for truth; the latter for truth and not for victory. "By their fruits ye shall know them."

Thus far we have been dealing with natural phenomena. We now approach a subject which may be considered as verging almost upon the supernatural and the miraculous. If we can believe what is asserted by a Russian naturalist, the larvæ of *Cecidomyia* differ, not only from the larvæ of all other known insects, but from all known animals, no matter to what Class they belong, in propagating their species while they are still in the larva or immature state. I am indebted to Baron Osten Sacken for furnishing me with the following account of this most astounding revelation;—

> About a year ago Wagner, a Russian naturalist and a good anatomist, published a large folio work in the Russian language, illustrated by numerous plates, relative to certain observations which he had made on *Cecidomyia*. He asserts that some larvæ of this genus, which he found under the bark of trees in winter, *breed young ones!* In other words, that during winter a second generation of larvæ is developed within the bodies of the first, that having reached a certain stage of growth these larvæ leave the bodies of the mother larvæ (several from each), and that they grow and afterwards produce a third generation in the same manner. This goes on till spring, when the last generation is transformed into flies. Thus the reproduction of these *Cecidomyia* would have some analogy with that of *Aphis*. A mother larva usually, he says, generates from 7 to 10 young larvæ, and at a certain stage of their growth she becomes half-dead and hardly moves, and finally dies, when the young larvæ

creep out. The development of the latter within the body of the mother lasts 8 or 10 days. After 3 or 5 days the same process is repeated within the body of the young larvæ. His statements and drawings are so precise and detailed, that it is difficult to discredit them. Nevertheless the novelty of the discovery (if it is one) is so overwhelming, that it is not generally credited yet. He does not explicitly mention, that his larvæ of the second and third generation have the "breast-bone" peculiar to *Cecidomyia*, but it follows indirectly from his statements.

There is no doubt whatever in my mind, that the 7 or 10 young larvæ that crept out of the body of the *Cecidomyia* larva, were nothing but the larvæ of *Chalcididæ* or *Proctotrupidæ*, several species of which I know from experience to breed in about those numbers inside the bodies of the larvæ of Willow *Cecidomyia*. The description of the mother larva being "half-dead and hardly moving," before they crept out, is to the life, and represents exactly what every breeder of Insects has witnessed a dozen times in the case of ichneumonized larvæ. As to Wagner's statement that these same newly-born larvæ went through the same process a second time, I cannot but believe that it is a pure and simple delusion. If I had found that the Gall-gnats of the Willow were ever infested by Ichneumon-flies or Tachina-flies, I should suppose the above to be a mere case of Secondary Parasites coming out of the bodies of Primary Parasites. But, so far as my experience extends, they are infested only by *Chalcididæ* and *Proctotrupidæ*. Now in 11 published cases of Secondary Parasites that I am acquainted with, two of which I have myself published, and in several unpublished cases that are known to me, the Primary Parasite is, in every one of them, either an Ichneumon-fly or a Tachina-fly, and never a Chalcidide or a Proctotrupide. Whence I conclude that there are most probably no Secondary Parasites that infest the genus *Cecidomyia*, because, if there were, they must in all probability, contrary to what seems to be a general rule, be parasitic on a Chalcidide or a Proctotrupide. We are not bound, however, to believe every erroneous or anomalous statement, until we can show how and why the error originated. When, as here, a supposed fact violates a law that prevails throughout Vertebrata and Annulata, and perhaps throughout the whole Animal Kingdom, viz: that it is only the adult animal that propagates its species, the *onus probandi* lies on the asserter of the fact, and not on the rest of the Scientific World. It is contrary to experience that lambs, and calves, and babies, and tadpoles, and larvæ, should propagate their species, but it is not at all contrary to experience that human eyes should be deceived. The well-known case of *Aphis* is not a case in point. It is not the *larva* of the *Aphis* that generates by parthenogenesis, but an adult, although wingless, dimorphous form of the winged imago of the ♀ Aphis. The whole question hinges entirely upon the presence of the "breast-bone" in these young larvæ, which Wagner asserts were produced from the bodies of *Cecidomyia* larvæ. If they had that "breast-bone," they were *Cecidomyia;* if they had not, they were beyond all question *Chalcididæ* or *Proctotrupidæ.* Yet, important as this point is, Wagner does not appear to have paid enough attention to it, to think it worth while to testify explicitly on the subject!

Since the above was written, Baron Osten Sacken has been kind enough to inform me that "Wagner's discovery is now very well known in Germany, and has been fully confimed by several observers." What is the entomological status of those observers, and how far their evidence is trustworthy, is not specified. They may be scientific tyros, or they may be good general Naturalists but very poor Entomologists, or they may be men of high standing and credit in the entomological world. For my own part, I would not believe in an anomaly which not only contradicts the known generative economy of all Vertebrate and Annulate Animals, but which also runs counter to what I know, from close and long continued observation, to be the generative economy of several other species of the same genus, viz: the Gall-gnats of the Willow, unless I saw it at least a dozen times with my own eyes, or unless it was vouched for by at least a dozen good and experienced Entomologists. It is utterly incredible that certain species of *Cecidomyia* should procreate in the larva state, while certain other species procreate in the normal manner. Now I know that the *Cecidomyia* of the Willow procreate in the normal manner; and therefore, firmly believe that all other *Cecidomyia* procreate in that manner. To believe to the contrary seems to me to require as much faith as to believe that certain Species of the genus Felis are viviparous, and certain other species of the same genus lay eggs and hatch them out like a bird; or, that certain Gallinaceous birds feed, when first hatched out, upon vegetable substances, and certain others suck the teats of their mothers like so many Mammals.

The Russian naturalist, however, and the unnamed German observers are by no means the first men that have been similarly deceived by parasitic insects. Some years ago one of the most celebrated of our Western *Savans* announced in print, as a great scientific discovery, that he had ascertained that Army-worms (*Leucania unipuncta* Haw.) were viviparous, and that they generated in precisely the same manner as Wagner supposed that *Cecidomyia* generated, i. e. in the larva or baby state. There can be no doubt, that what he took for young Army-worms issuing out of the bodies of their mothers were simply the larvæ of Ichneumon-flies—probably *Microgaster militaris* Walsh or *Pezomachus minimus* Walsh, which I have myself bred from Army-worms. But the mistake was the more inexcusable on his part, because if he had simply looked at one of his so-called young Army-worms with his naked eye, he would have seen at once, that, unlike the mother-insect, it had *no legs at all;* and if he had known anything at all of Lepidopterous larvæ, he would have known that they had just as many legs when they first hatched out, as when they were full-grown. On the other hand, in Wagner's case, both the so-called mother larvæ and the young larvæ were apod, and putting the "breast-bone" out of the question, it requires practiced eyes and close scrutiny to distinguish the larva of a Gall-gnat from that of a Chalcidide, or from that of a Gall-fly. We saw just now (p. 551) that several distinguished European naturalists had mistaken the larva of a Gall-gnat that inhabits the "Rose-willow" for the larva of a Gall-fly; and I am not ashamed to confess that I myself formerly mistook the dried larva of another Gall-gnat for the larva of a Gall-fly. (*Proc. Ent. Soc. Phil.* II. p. 481–2)

Like most gall-insects, and even more so than most of them, the Gall-gnats are difficult to rear in the house. The reason is obvious. When the connection between the gall and its parent plant is severed, it is almost impossible to devise any artificial mode of treatment, which shall supply the place of the natural flow of moisture from the part of the plant on which it formerly grew. Of the eight new Cecidomyidous galls on the Hickory described by Osten Sacken, (*Dipt. N. A.* pp. 191—4) he obtained the imago from but a single one. Of the fifteen new Cecidomyidous galls on the Willow which I now describe, I have obtained the imago from all but nine, and one of these nine is a species which does not grow near Rock Island. The method by which I achieved these results was to replace the galls in the breeding-jar, whenever practicable, every four or five weeks by freshly gathered ones; which, as most Willow-galls are exceedingly abundant, is not a matter of much trouble or difficulty.

In the following Synoptical Tables I have endeavored to separate, by constant and sharply-defined characters, drawn from every available source, the fifteen species of Cecidomyia known by me to form galls on the Willow. After this, each gall and its gall-maker in all its states will be described so far as known to me, chiefly from recent specimens, and the whole will conclude with descriptions of all the Inquilinous *Cecidomyidæ* that are known by me to inhabit any galls of the Willow, whether Cecidomyidous or Tenthredinidous, and a list of the galls inhabited by each species, followed by a notice of a few other Diptera that occasionally or habitually breed in Willow-galls.

SYNOPSIS OF THE CECIDOMYIDOUS GALLS OF THE GENUS SALIX (WILLOW).

A. Gall always monothalamous, and evidently a deformation of a bud.	
I. Bud with its leaves well developed.	
1. Galls almost always many of them growing contiguously together, not usually at the tip of a twig. (Gall large, expanding .75—2.25 inch.)	1, **S. brassicoides**, n. sp. on S. longifolia.
2. Gall always solitary, and always growing at the tip of a twig.	
† Leaves of the gall all sessile.	
a. External leaves appressed like the scales of a young pine-cone, and rounded at tip except near the tip of the gall, where they are angulated. (Gall large, expanding .50—.90 inch.)	2, **S. strobiloides** O. S. on S. cordata.
b. External leaves appressed like the scales of a young pine-cone, and all of them angulated at tip. (Gall large, expanding about .70 inch.)	3, **S. strobiliscus** n. sp. on S. rostrata.
c. External leaves generally opened out and recurved at tip, and always more or less beaked at tip. (Gall small, expanding .14—.60 inch.)	4, **S. gnaphalioides** n. sp. on S. humilis.
†† Terminal leaves peduncled, the other external leaves sessile and opened out, and at tip recurved and acutely angulated. (Gall large, expanding .70—1.90 inch.)	5, **S. rhodoides** n. sp. on S. humilis.
††† All the external leaves peduncled more or less, the terminal ones the most so, and opened out and at tip recurved, and obtusely, seldom acutely, angulated. (Gall very large, expanding 1.95—4.10 inch.)	6, **S. coryloides** n. sp. on S. discolor?
II. Bud deformed into a long tube; its leaves obliterated.	7, **S. cornu** n. sp. on S. humilis.

B. Gall a deformation and swelling of the twig itself.	
1. Gall monothalamous, solitary, woody.	
a. Gall oval, growing always at the tip of the twig, but always including several of the sub-terminal buds, which are usually aborted, the terminal one always.	8, **S. siliqua** n. sp.? on S. humilis, (S. cordata? and S. discolor?)
b. Gall generally oval, generally growing some distance from the tip of the twig and but rarely including even a single bud, occasionally at the tip, when it includes only the terminal bud, which is then more or less aborted and occasionally obliterated.	9, **S. nodulus** n. sp. on S. longifolia.
2. Gall polythalamous, woody, growing not far from the tip of the twig, each cell excavated at the origin of a bud, and opening outwards through that bud, which is deformed so as to form part of the cell.	
a. Gall oval and bulging, the twig where it grows being enormously contracted in length.	10, **S. triticoides** n. sp. on S. cordata.
b. Gall cylindrical and not bulging, the twig where it grows not being very much contracted in length.	11, **S. hordeoides** n. sp. on S. humilis.
3. Gall polythalamous, more or less spongy, with its cells all internal.	12, **S. batatas** n. sp. on S. humilis, (S. cordata? and S. discolor?)
C. Gall growing out of the leaf, the shape and structure of the leaf still plainly perceptible, monothalamous, but several of them often confluent.	
1. Growing sparsely from the midrib or one of the principal veins.	13, **S. verruca** n. sp. on S humilis.
2. Growing very numerously from the general surface of the leaf.	14, **S. semen** n. sp. on S. nigra.
D. Gall growing from the flower-catkins (and sometimes from the leaves?) and destroying all vestiges of their structure, so as to appear like the crumpled mass of aborted flower-buds in a common cauliflower.	15, **S. ænigma** n. sp. on S. nigra.

Putting the gall out of the question, and looking only to the insect in all its states, the species 1, 2, 4, 5 and 8, which resemble one another so closely, that several of them are undistinguishable in the imago state, not only in the dried but in the recent specimen, may be separated as follows. Nos. 3, 6 and 7 belong to the same group as 1, 2, 4 and 5. but, as they are not known to me in the imago, are necessarily omitted here. I find that certain Lepidopterists repudiate the idea, that it is possible for two species of insects, like the two *Halesidota* referred to in a previous Article, to be undistinguishable in the imago, and yet perfectly distinct in some of their other states. The study of the genus

Cecidomyia might serve a useful purpose towards dispelling that illusion.

A. Front ½ of pupal integument whitish like the abdomen. (Larva varied with yellowish or orange.)

1. Hair of thorax blackish in the imago......No. 1, **C. s. brassicoides**, n. sp.
2. Hair of thorax whitish in the imago.
    - † Origin of the anterior branch of the 3rd longitudinal wing-vein obsolete............No. 2, **C. s. strobiloides**, n. sp.
    - †† Origin of the anterior branch of the 3rd longitudinal wing-vein pretty distinct.
        - *a.* Cocoon 1½—2 times as long as the larva..No. 4, **C. s. gnaphalioides**, n. sp.
        - *b.* Cocoon 2½—3 times as long as the larva..No. 5, **C. s. rhodoides**, n. sp.

B. Front ½ of pupal integument pale dusky.* (Larva varied with sanguineous.).......................No. 8, **C. s. siliqua**, n. sp. ?

GALLMAKERS.—Genus **CECIDOMYIA**, Subgenus **CECIDOMYIA**.

No. 1. **Gall Salicis brassicoides**, n. sp.—On Salix longifolia. Monothalamous, sessile galls, expanding each ¾—2½ inch, and with the general outline of each spherical or oval, growing in a more or less close-set bunch of 1—11, like the sprouts of a cabbage-stump, on twigs which vary in diameter from .10 inch to .50 inch, sometimes from their tips but more generally from their sides, and often with several minute twigs growing from the midst of each bunch of galls, the largest galls generally on the largest twigs. The leaves composing each gall are all sessile, and are on the outside ovate lanceolate or lanceolate, and widely expanded and towards their tips recurved. Towards the tip of the gall they become smaller, slenderer, and gradually less expanded, and in the centre they are quite small, perfectly straight and linear-lanceolate, closely embracing the central cell containing the author of the gall. External leaves with the midrib, and generally some of the branching side-veins, pretty distinct. It is but very

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*It must not be supposed that this infuscation is causeless and accidental. There is a cause for every natural phenomenon, if we can only discover it; and the reason why the anterior parts of the pupal integument are in this species strongly tinged with fuscous, instead of being whitish hyaline, as in other allied species, is that they are thickened; and the reason that they are thickened is, that the pupa has to make its way out through the narrow, woody tube at the tip of its gall, instead of through soft and yielding leaves as in the case of species Nos. 1—6. In the same manner, as will be noticed below, the antennal horns of those species that have to work their way out through dense sponge or wood (*C. s. batatas* n. sp. and *Cec. cornuta* n. sp.) are thickened and blackened in the pupal integument. We must remember that the pupal integument of an Insect bears the same relation to the pupa itself, that the prepared skeleton of a Mammal bears to the Mammal itself.

rarely that the leaves composing each gall show any traces of the peculiar, widely-removed serratures which characterize the leaves of the willow on which they occur, their edges being almost invariably perfectly entire. The color of the galls when recent, is the same as that of the recent leaves of the willow on which they grow, but at the fall of the leaf they become reddish brown, and after hanging on the twig more than one year, almost black.

Described from 19 bunches of galls. Very common near Rock Island, Illinois.* The eggs that originate these galls must be laid from the middle of April to the end of May, and by the middle of July the galls have attained their full size. When the twig on which they grow is at all small, it generally dies the next spring.

Larva.—On July 31 the larva was already .03—.10 inch long, and whitish hyaline with opaque, white, curdy, bowel-like markings; breast-bone indistinct. Out of 12 specimens examined Nov. 12, all had formed their cocoon and were full-grown, being .10—.20 inch long and .05—.10 inch wide, of the usual oval form, rarely elongate so as to be 3 or 4 times as long as wide, whitish or yellowish subhyaline, with the same opaque-white markings; breast-bone distinct, dusky, robustly Y-shaped; the two prongs of the Y placed in front, basally divaricating at an internal angle of about 45°, and tapering on their external edge into a slender, acute thorn at tip, so that their external edges are nearly parallel with each other. Ordinarily the three arms of the Y are subequal in length, but occasionally the lower (or posterior) arm is shortened about ½, and occasionally the other two arms are similarly shortened. The lower extremity of the Y is generally squarely but obscurely truncate, but sometimes the whole lower arm tapers gradually to a point from the bifurcation downwards. The *cocoon* is whitish-hyaline, delicately thin, scarcely larger than the larva, and generally adheres laterally and especially towards its base to a few of the innermost small leaves of the gall, its base being imbedded in a shallow, cup-like cavity at the tip of the globular stem from which the leaves of the gall take their origin. In this cocoon the larva, as well as the pupa, is always found with its head towards the tip of the gall. On Feb. 20 the larvæ were more generally and more deeply yellowish, the breast-bone darker, and many of them had a broad, dorsal, dusky vitta on 3 or 4 of the middle joints. One contained 15 parasitic larvæ, showing plainly through its integument, in the manner figured by Westwood *Intr.* II. p. 167, fig. 14, which I afterwards squeezed out and counted, and April 19 I found a similar specimen containing 10 larvæ. On Feb. 20 I also found a single Proctotrupide imago inside each one of 11 or 12 cocoons, all very lively when disengaged from their own cocoon. On March 29 I found nothing but larvæ in very numerous galls which I opened, and continued to find very many larvæ up to April 21, and for some time afterwards. Those examined April 19 were more highly colored, being yellowish-

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* I found, March 16, on the tips of the twigs of young, stunted, wild plum-trees, bunches of galls much resembling *S. brassicoides*, but with the cells all of them empty.

opaque, with the usual markings yellowish-white instead of white, and a dark vitta on 3 or 4 of the middle dorsal segments.

Pupa.—On April 12 I found three pupæ in the galls. Length .16 inch; abdomen orange, in one instance tinged with sanguineous, the rest of the body and the head bright sanguineous. The horn at the base of each antenna is obtusely conical, projecting in an angle of about 100° with a minute thorn at its apex, and the two horns divaricate from each other at an angle of 100°—110°. No post-antennal bristle. Thoracic bristle about ⅓ as long as the thorax is wide. A pupa examined April 15 was of a nearly uniform, palish, sanguineous color. The empty pupal integument (1 specimen) is uniformly whitish, save that the base of the antenna is a little obfuscated.

Imago. C. s. brassicoides n. sp. ♂ ♀.—(Recent) Brown-black, a little paler beneath. *Head* with the antennæ ♂ a little tapered towards the tip, about ¾ as long as the dried body, 22—24-jointed (2+20 to 2+22) and perhaps in a single antenna 20-jointed (2+18), the same individual often having one more joint in one antenna than in the other, the last joint even in the 24-jointed antenna tapered to a more or less elongate point at tip, so as to be undistinguishable from the last joint of a mutilated antenna; the flagellar joints globular, verticillate and pedicelled, with the pedicels ½ as long as the globular part, and the verticils fully as long as two of the complete joints from which they spring. Antennæ ♀ scarcely tapered, about ⅓ as long as the dried body, cylindrical at tip, moniliform towards the base, the joints difficult to count but apparently nearly as numerous as in ♂, short, sessile, and but slightly verticillate, the verticils as long as the one joint from which they spring. Occiput grayish in the living insect, black in the dried specimen. *Thorax* with erect, rather sparse, dusky hair; origin of the wings and a large spot beneath them orange or pale sanguineous in life, dull rufous when dried. Halteres (dried) brownish white, rarely fuscous, the club always more or less fuscous, its extreme tip generally showing a whitish reflection. *Abdomen* ♂ (recent) dorsally brown or dull luteous with cinereous hairs, ventrally pale brown or dull luteous with depressed whitish hairs. Abdomen ♀ (recent) with the dorsum sometimes entirely brown-black, sometimes brown-black with the hind edge of each segment when viewed from behind slightly sanguineous, sometimes dark sanguineous, sometimes sanguineous, sometimes with its anterior ½ sanguineous and its posterior ½ pale yellowish brown; sometimes again with brown hairs occupying ½ or ¾ of the anterior surface of each joint, and the lateral hairs cinereous and longer towards the tip of the joint, sometimes with cinereous hairs and the lateral hairs whitish, sometimes with the hairs, especially the lateral ones, twice as long and dense in one specimen as in another, the two both unrubbed and fresh and hatched out the same day; and finally sometimes on joints 3—6 with a subterminal, transverse, impressed, glabrous line, which in other specimens is obsolete or subobsolete. Venter ♀ sometimes dark sanguineous, sometimes sanguineous on the anterior ¾ and the rest pale yellowish brown, always with short, dense, appressed, white hairs concealing its color except where they are removed. Oviduct sometimes protruded so as to be ½ as long as the rest of the abdomen, sometimes entirely retracted so that the tip of the ♀ abdomen appears as truncate as in ♂. In the dried ♂ ♀ specimens the abdomen becomes of an obscure, blackish color. *Legs* brownish white or occasionally dull yellowish, in the living and sometimes in the dried specimen with a silvery reflection. sometimes with only the three or four terminal joints of the tarsi fuscous, sometimes in addition with the terminal ¼ of the femora superiorly fuscous, sometimes in addition with the superior surface of the entire leg, except the base of the femora, fuscous. *Wings* tinged with dusky from minute, short, appressed, dusky hairs, the cross-vein between the 1st and 2nd longitudinal veins always distinct, but placed close to the base of the wing. The 2nd longitudinal vein scarcely recurved at its extreme tip. Anterior branch of the 3rd longitudinal vein springing from the main vein at an angle of about 135°, and generally but not always traceable all the way to its origin: the entire branch recurved nearly so as to describe the one half of an ellipse about 3 times as long as wide and longitudinally bisected. Length (dried) ♂ .10—.15 inch, ♀ (including ovipositor) .16—.20 inch. Wing ♂ ♀ .18—.20 inch.

Six ♂, sixteen ♀, the first of which came out April 17 and the last May 26, others continuing to come out for several weeks afterwards. The ♀ ♀ are much more numerous, as usual in this genus, than the ♂ ♂.

No. 2. **Gall S. strobiloides** O. S.—On S. cordata. A monothalamous gall like a pine-cone, always on the tips of twigs when young, but often with small shoots of the same year's growth surrounding it, porrect, .50—.90 inch in its transverse diameter, and in stunted galls where the gall-maker has perished even as small as .20 inch in diameter, generally when viewed laterally with an ovate outline and the tip more or less truncate, occasionally subspherical. The leaves composing it are all sessile, closely appressed and imbricate, and all those on the outside are covered with a short, dense, glaucous-white pubescence on their entire exterior surface, and occasionally in a less degree on their interior surface, and are reddish-brown inside when mature, those on the inside of the gall becoming gradually smooth and reddish-brown on their exterior basal portion, and finally throughout. Towards the base of the gall the leaves are orbicular, the basal ones smaller; the next leaves are obovate and with their tips in a semicircle, and as they approach the tip of the gall oblanceolate, and in the inside linear-lanceolate and gradually smaller, slenderer and straighter, till they finally embrace the central cell containing the author of the gall. External leaves, except towards the tip of the gall, with a number of branching veins springing from their base, the midrib scarcely distinct from them by its superior size and throwing out similar branches, all of them obvious on the internal face of the leaf and obsolete on its external face. The tip of the twig from which the leaves spring, both in this and the 4 following species, is constructed as in *C. s. brassicoides*.

Described from 30 specimens. Very common and abundant in Rock Island County, Illinois, hundreds of them occurring on a single bush. None of the leaves composing this gall are ever serrate, as in the willow on which it grows, but always entire. When young and immature, the galls are spherical and are enveloped in a dense mass of foliage, which gradually falls off towards the autumn, and by November the twigs on which they grow, if small, are already killed for an inch or two downwards. Occasionally at the extreme tip of the gall the leaves open out a little, as in *S. strobiliscus* n. sp., but without projecting from the tip as in that species. Easily distinguished from that gall by the portion of each leaf which lies "to the weather," towards the base of the gall, not terminating in a rectangular point, but describing a circular arc. The leaves are also more densely pubescent, especially the portion that lies "to the weather." Appears early in the summer and is full-sized by the middle of July, at which time that which is reddish brown in the dry gall is greenish white. The pubescence on the leaves retains its glaucous-white color to the last, except where they are badly weather-beaten. On the same bush throughout the summer may be seen the old, dry, last year's galls, and the young growing galls of the current year. I have already referred to the *Orchelimum* eggs often found under the scales of this gall. (*Proc. Ent. Soc. Phil.* III. p. 232.) In one gall examined this autumn I counted no fewer than 71 of these eggs. In September I detected a species of *Xiphidium*, which according to Mr. Uhler is undescribed, ovipositing in the pith at the tip of a broken stem of Golden-rod (Solidago). Probably *Locustariæ* Latr. (=Gryllidæ Leach) do not so generally oviposit in the earth as authors have hitherto led us to believe.

LARVA.—Five specimens examined Nov. 15 and many subsequently did not differ from the larva of *S. brassicoides*, the breast-bone being similar and varying in the same manner. Length .08—.20 inch, breadth .04—.07 inch. Out of nearly 20 galls opened at this date all contained the cocoon, though many cocoons contained another cocoon in which lay a Proctotrupide imago about .10 inch long. The cocoon differs from that of *S. brassicoides* in being 2½—3 times as long as the larva and truncate at tip, the tip end forming a kind of diaphragm not far from the tip of the lanceolate cell formed by the interior leaves. The diameter of the cocoon does not greatly exceed that of the larva, which is always found lying closely in its basal end, the rest of it being hollow and empty. Specimens of the larva examined Feb. 20 were of a pale orange-color, and others examined March 20 of a deep orange-color.

Others on April 23 were yellowish opaque with whitish mottlings and a honey-yellow vitta occupying ⅓ of the dorsum on 4—6 of the middle dorsal joints. Another specimen was yellowish immaculate. On April 8 most of the galls still contained the insect in the larva state, and in a few the insect was still in that state April 30 and May 3.

PUPA.—Does not differ structurally from that of *S. brassicoides*. The first pupæ were found April 8, when the abdomen was tinged with sanguineous, and the fore part of the body, and especially the eyes, were strongly sanguineous. Another pupa occurred April 30 and others May 3. One that had been a week out of the cocoon was, on April 15. all bright pinkish-scarlet or sanguineous. The empty pupal integument (18 specimens) is whitish, scarcely tinged in front with fuscous. Length of the pupa (2 dried specimens) .15 inch.

IMAGO. C. S. STROBILOIDES, n. sp. ♂ ♀.—The imago differs from that of *C. s. brassicoides* only as follows:—*1st*. The ♂ antennæ are generally 21-jointed (2+19), but in one ♂ one antenna is 22-jointed (2+20), the two last unconnected by any pedicel. I noticed April 10 in the antenna of a recent ♂ (not the one with one 22-jointed antenna) that the last joint is small and cylindrical, equal in length to the penultimate but apparently connate with it. *2nd*. The hair on the thorax is whitish, not blackish. *3rd*. The dorsum of the abdomen ♀ is more nearly free from hair, and laterally the subterminal hair of each joint is longer. denser and whiter, and there is never, so far as I could observe in the recent specimens ♀, any subterminal, glabrous, impressed, transverse line on the middle joints. *4th*. The origin of the anterior branch of the 3rd longitudinal wing-vein is always obsolete for a short space, as it sometimes is also in *C. s. siliqua* n. sp.? and occasionally in *C. s. brassicoides*. The dimensions are about the same as in *C. s. brassicoides*. Five ♂, twenty-eight ♀. The first imago appeared April 5 and the last May 10, the ♀ ♀, as usual, much more numerous than the ♂ ♂. On April 6 a ♀ laid very numerous eggs, which were cylindrical, 3 times as long as wide, .03 inch long, blunt-pointed at each end, and of a blood-red color, in the bottle in which I had confined it.

No. 3. GALL S. STROBILISCUS, n. sp.—On S. rostrata, a high northern willow not found near Rock Island. I only know this species from a single dried and mature specimen received from Mr. Bebb, and gathered in Winnebago Co., on the extreme northern border of Illinois.

It has a diameter of .70 inch and differs from *S. strobiloides* O. S. 1*st*. In the tips of all the leaves on the outside of the gall, and not merely those towards the tip of the gall, being angulated not rounded. 2*nd*. In their external surface not being so strongly pubescent, especially the portion lying "to the weather." 3*rd*. In the leaves at the tip being almost linear or parallel-sided instead of oblanceolate, and proportionally about ½ longer so as to project in a kind of beak from the tip of the gall. 4*th*. In the tip of the gall being more open than is usual in *S. strobiloides*. 5*th*. In the veins even on the inside of the leaves being subobsolete. The cocoon, as far as can be judged from what remains of it, was similar to that of *S. strobiloides*, but unfortunately it contained, not the larva or pupa of the *Cecidomyia*, but a parasitic *Callimome*, which infests several of these Gall-gnats, in the imago state. Hence, and from the fact of there being catkins in flower on the twig on which it grew, we may know that the specimen was about 10 or 11 months old when gathered. As usual in mature *S. strobiloides*, the twig on which it grew had been killed immediately below it for the space of ½ an inch or so. Since it might possibly have been the case that it was this species, and not my *S. strobiloides*, which was named *strobiloides* by Baron Osten Sacken, as he merely describes his gall as being "in the shape of the cone of a pine and an inch or more long," I communicated to him the distinctive characters between the two species, and he has been kind enough to inform me that my *S. strobiloides* is identical with his. The specimens which he originally used were obtained in Northern Illinois, and he tells me that he afterwards gathered a single one in Massachusetts, so that we know of this one gall, at all events, that has a wide geographical range.

LARVA, PUPA and IMAGO unknown.

No. 4. **Gall S. gnaphalioides**, n. sp.—On S. humilis. A monothalamous, small, solitary, oval or sometimes subspherical gall, .23—.55 inch long and .14—.60 inch in diameter, almost always growing at the tip of a twig and without any side-shoots around it, very rarely from the side of a twig from a small side-shoot no longer than itself, sometimes porrect but oftener with the last inch or so of the twig on which it grows curved downwards, or angularly bent downwards, or coiled 2 or 3 times round like the tendril of a vine. The leaves composing it are imbricate, sometimes more or less loosely appressed, (when it resembles somewhat the little lemon-yellow garden-flowers known as "everlastings" or "immortelles" or the indigenous Gnaphalium polycephalum,) but more usually opened out towards their tips, and always with their extreme tips more or less pinched together so as to form a kind of beak and frequently reflexed. These leaves are all entire, sessile, pale green in the summer and in the autumn of a pale reddish brown or pale yellowish brown color with fine, appressed, whitish pubescence on their external surface, and they have a few indistinct longitudinal veins but no normal midrib and side veins as in *S. rhodoides*. At the base of the gall they are small and orbicular, then larger and orbicular, then oval, then towards the tip of the gall elongate-oval and elongate-obovate, the tip of the leaf in each case taper-pointed in an angle of about 80° so as to form the beak before spoken of. In the inside they become linear-lanceolate and envelop the central cell as in the preceding species.

Described from 72 specimens. Attains its full size by the end of July, and is quite common near Rock Island, Illinois. In two or three cases where the potato-like gall *S. batatas* n. sp. grew at the tip of a twig, I have noticed the gall *S. gnaphalioides* growing sessile from near the tip of the other gall, evidently from one of the buds included in it. In November I have observed that many of these galls have the larva picked out of them, evidently by birds, and in February full ¾ of them are thus emptied, the leaves of the gall being pecked off on one side. This does not occur with the allied galls *S. brassicoides*, *S. strobiloides*, and *S. rhodoides*, probably because the larva is there concealed and protected by a much thicker wall of leaves; but I have repeatedly in the winter noticed the same thing of the large, spongy gall of the Dipterous *Trypeta solidaginis* Fitch. Easily distinguished from its five allies by its much smaller size. From *S. brassicoides* it is also distinguished at once by its always being solitary; from *S. strobiloides* by the tips of the leaves that lie "to the weather" being not rounded but angulated and beaked; from *S. strobiliscus* by the tips of the leaves being generally opened out and recurved, and always beaked; and from *S. rhodoides* and *S. coryloides* by all the leaves being sessile, instead of the terminal leaves, and in the latter case almost all the leaves, having peduncles.

LARVA.—On July 30 the larva was not yet discoverable in the gall. August 27 it was .06—.07 inch long, yellowish or orange-color, with dominant, bowel-like, white markings, and the breast-bone indistinct. Several larvæ examined November 11 and 18 were undistinguishable from those of *S. brassicoides*, *S. strobiloides* and *S. rhodoides*, and had the same breast-bone with the same variations. Length .10—.12 inch. In over a dozen galls opened at these dates the larva had made its cocoon, which was 1½—2 times as long as the larva itself and of the usual white, filmy texture, and had the same diaphragm at tip as in *S. strobiloides*. On March 6 the galls still contained the insect in the larva state.

PUPA.—April 23 and May 12 I found four living pupæ in these galls. They differed structurally in no respect from those of the preceding species, and were nearly as long as the cocoon and not far short of the length of the gall. The abdomen was dark blood-red, generally tinged and marked with fuscous, the other part of the body, including the wing-cases and legs, blackish, except the thoracic bristles, which were in one specimen noticed to be whitish. One of these four developed into the imago an hour after the description was taken. Length (4 dried specimens) .12—.13 inch. The pupal integument (3 specimens) is whitish, immaculate. On opening 20—30 galls May 13, from which I had attempted to breed the imago, I found dead pupæ in all of them

IMAGO. C. S. GNAPHALIOIDES, n. sp. ♀.—Differs from *S. brassicoides* ♀ only in the size being slightly smaller and the hair of the thorax whitish not blackish, and in the lateral sub-terminal hairs on the joints of the abdomen being perhaps a little longer than is usual in that species. The halteres are almost entirely pale; and the legs are as pale as in the palest *C. s. brassicoides*, and perhaps slightly more whitish. From *S. strobiloides* ♀ it differs in the size being slightly smaller and in the origin of the anterior branch of the 3rd longitudinal vein being pretty distinct; from *S. rhodoides* ♀ only in the size being slightly smaller; and from *S. siliqua* ♀ in the legs and the hair of the thorax being rather whiter, and also, as in the preceding three, in the size being slightly smaller. Length ♀ (including oviduct) .12—.15 inch; wing ♀ .12—.16 inch. Three ♀; ♂ unknown. Appeared April 23—May 6. One of the above ♀ ♀ was immature, and when recent had the abdomen sanguineous, the medial ½ of the dorsum of each joint covered with pale brown hair, and no lateral subterminal white hairs; the venter was covered with short, appressed, white hair. Another ♀, which I had kept alive and exposed to the light for 2 days, had when recent the medial ⅔ of the dorsal joints of the abdomen deep brown, the other part bright sanguineous, and the venter sanguineous with short, appressed, white hairs. In this specimen, even when dried, the lateral white hairs of the dorsal joints of the abdomen are pretty obvious.

No. 5. **Gall S. rhodoides**, n. sp.—On S. humilis. A monothalamous gall like an elongated rose, always growing singly on the tip of a twig, porrect, its general outline elongate-spherical, occasionally spherical and rarely short-spherical, .90—1.80 inch long and .70—1.90 inch in diameter, never with any twigs, however small, growing round it from the same stem. The leaves composing it are slightly pubescent, entire, with the midrib and branching side-veins very conspicuous, and are almost always opened out and with their tips recurved and occasionally at the extreme tip a little pinched together, but in a few cases they are loosely appressed except at the tip of the gall. The basal ones are small, the following ones larger, all sessile and heart-shaped with the basal lobes of the heart squarely truncate and the tip almost always taper-pointed in an angle of 70°—80°; towards the tip the leaves become smaller and gradually more and more peduncled, till at the extreme tip the peduncle is generally twice as long as the leaf itself. Inside the gall the leaves suddenly become linear-lanceolate and gradually straighter as they approach the centre, till they finally embrace the lanceolate central cell precisely as in *S. strobiloides.* Sometimes the peduncled leaves at the tip protrude from the gall as the stamens and pistils of some flowers protrude from the corolla.

Described from 15 galls freshly gathered in November, and 50—70 gathered in July. Very common in Rock Island County, Illinois. This gall arrives at its full size by the middle of July, when the outside leaves are externally palish green, often changing towards the tip of the gall to pale yellowish green slightly tinged with rosy and externally more or less glaucous. In the autumn the leaves become pale greenish brown with a slight whitish pubescence externally, and, after hanging on the twig over a year, almost black.

LARVA.—By July 30 the larva is already .07 inch long, subhyaline, with opaque, curdy, white markings, and a long internal yellow stripe representing probably the intestinal canal; breast-bone indistinct. November 16, out of about a dozen galls opened, all but one larva had formed their cocoon, which exactly resembles that of *C. s. strobiloides.* The breast-bone in all was quite distinct and resembled exactly that of *C. s. brassicoides*, varying in the same manner, and in all other respects the two larvæ were undistinguishable. Length .10—.12 inch. On February 25 the larva (many specimens) was .15 inch long, pale orange, the orange color mostly concealed, except the sutures and sometimes the 3 anterior joints and a dorsal line, by whitish, bowel-like markings. A larva examined April 23 was .19 inch long, .07 inch wide, yellowish opaque, with whitish bowel-like markings and a broad dorsal fuscous vitta. Breast-bone as in *C. s. strobiloides.*

PUPA.—March 16 I found a gall with the insect in pupa. A pupa examined April 15 was yellowish a little mottled with sanguineous, but in all other respects exactly resembled that of *C. s. strobiloides* when placed side by side. Another examined April 21 had the thoracic bristle rather robust at base and tapering towards the tip, but in the dried specimens this part is undistinguishable from the same part in *C. s. strobiloides.* April 23 of 3 pupæ examined one was pale sanguineous, with the wing-cases and legs pale yellowish and the abdomen mottled with yellowish between the sutures, and two were blackish, including the wing-cases and legs, with the abdomen sanguineous or dull lake-red broadly vittate dorsally with fuscous. An hour afterwards the two last developed into the imago state. Length (3 dried specimens) .15—.17 inch. The empty pupal integument (11 specimens) is nearly pure white throughout.

IMAGO. C. S. RHODOIDES n. sp.—The imago ♂ ♀ is undistinguishable from that of *C. s. brassicoides*, except as follows:—1*st*. The antennæ ♂ are 23—25-jointed (2+21 to 2+23), with the last joint elongate and sometimes even in the 25-jointed antenna appearing to be composed of two connate joints. In a single ♂, which has only one antenna, the antenna is 21-jointed (2+19,) the last joint very small and without any pedicel, and I counted the joints as "20 or 21" in the same specimen when recent. Occasionally in the same specimen there is one more joint in one antenna than in the other. 2*nd*. As in *C. s. strobiloides*, *C. s. gnaphalioides* and *C. s. siliqua*, the hair of the thorax is whitish instead of blackish, and it is more conspicuously whitish than in the last-named species. 3*rd*. As in these species, the subterminal, lateral hairs of the dorsal joints of the abdomen are longer, denser and whiter than they usually are in *S. c. brassicoides*, and the subterminal, transverse, glabrous line seen in some *C. s. brassicoides* is not perceivable. 4*th*. The legs are rather whiter than is usual in *C. s. brassicoides*. On April 21 a ♂ emerged from the pupa under my eyes. As it came out, the abdomen had the sutures widely sanguineous and the tip sanguineous, the dorsal space between the sutures covered with appressed brown hairs which occupied the medial ½ of each joint. The venter was dull yellowish. Three hours afterwards the dorsum of the abdomen, including the sutures, was entirely fuscous, and also the venter except the tip and forceps which were yellowish. A ♂ examined April 28 had the dorsum of the abdomen entirely fuscous, but on removing some of the dorsal hairs the sutures were narrowly blood-red when viewed from behind. The venter was dark blood-red on removing some of the white pubescence which concealed the color. A mature ♀ on April 21 had the dorsum of the abdomen fuscous, except the sutures which were slightly brick-red. Another ♀ less mature had the whole dorsum of the abdomen a dirty red and the venter brick-red. April 22 a ♀ had the abdomen dorsally fuscous with a few appressed brown hairs with no reddish sutures, the venter dull rufous and the oviduct rufous. Another ♀ April 25 had the dorsum of the abdomen fuscous, with the sutures narrowly sanguineous, but only when viewed from behind. The venter, on removing some of the short whitish pubescence, was dark blood-red. Dimensions about the same as in *C. s. brassicoides*. Eight ♂, seven ♀. The first imago appeared April 12 and the last April 28.

No. 6. **Gall S. coryloides** n. sp.—On S. discolor? A very large and loosely expanded, monothalamous gall, resembling at a distance a bunch of hazel-nuts in their natural husks, growing singly at the tip of a twig without any shoots surrounding it, porrect, its general outline spherical, sometimes elongate-spherical or short-spherical, 1.76—2.35 inch long and 1.95—4.10 inch in diameter. The leaves composing it are on the outside large in proportion to the size of the gall, so that some of the middle ones are occasionally two inches across, free from pubescence except sometimes on their external base, entire, with the normal midrib and branching side-veins distinct, and are all of them very much opened out and recurved, the basal ones the most so, so that the latter often touch with their tips the twig on which the gall grows. The basal leaves are orbicular-ovate or ovate, only slightly smaller than the middle ones; the middle ones are ovate, and both basal and middle ones have their tips tapering regularly in an angle of about 80°—90°, not taper-pointed in an angle of 70°—80° as is generally the case in *S. rhodoides;* and their base describes an angle of about 90°, instead of being squarely and widely truncate, as in *S. rhodoides*, and even on the extreme base of the gall generally has a short peduncle nearly ⅓ as long as the leaf itself, which in each successive leaf gradually becomes longer as the tip of the gall is approached, when it is about equal in length to the leaf, which has now become oblanceolate. On the inside, the leaves suddenly become straight, porrect, and very much smaller, and are elongate-linear with their tips tapered to a very acute point, closely appressed, and gradually smaller, till they finally embrace the lanceolate central cell. In the autumn the leaves of this gall are dark reddish-brown, externally with a slight whitish bloom; at other seasons it is unknown to me.

Described from 4 specimens. Very near *S. rhodoides*, which occurs on a totally different willow, but sufficiently distinguished by the characters specified in the description, as well as by its average size being just double. One of the above 4 galls had the heart eaten out by some lepidopterous larva; and adhering to the leaves of another was the pupal integument of a Lepidopteron, much larger than any of those commonly bred by me from the allied galls. All of them, as is very generally the case in this group of galls, had many of their leaves eaten into by Lepidoptera, and contained much Lepidopterous "frass" or excrement.

I know but three Willow-bushes near Rock Island which can be referred to S. discolor. One of them, a ♀, of which I forwarded to Mr. Bebb the inflorescence, was pronounced by him to be certainly S. discolor; it was from this one that I obtained the galls, which for the present I refer to *S. batatas* and *S. siliqua.* Of the second, also a ♀, I forwarded nothing but the fruit, and Mr. Bebb referred it doubtingly to S. discolor, but thought it might possibly be S. eriocephala. I have carefully compared foliage, twig and bud in these two, and have little doubt they are identical. At all events their very robust, vigorous twigs, tinged with purple and covered with whitish pulverulescence, so as strongly to recal those of many varieties of apple-tree, and the large buds which have commenced opening out even as early as the last of November, effectually distinguish both, even in the winter time, from the 4 other species of Willow found near Rock Island. The third bush was not discovered by me till the last of November, and agrees so perfectly in all the above characters with the one which is undoubtedly S. discolor, as well as in the foliage, some of which still adhered to its twigs, that I have little hesitation in referring it to the same species. I observed however on its main limbs large blotches or wide bands of whitish-gray, which could not be seen on either of the other bushes. In any case the inflorescence next spring will definitively decide the question of its specific identity with S. discolor. It was on this last that I found the galls *C. coryloides;* the second bush bore no galls at all.

It thus appears that of the 5 willows growing near Rock Island, four have galls all constructed on the same fundamental principle out of deformed buds, and one of them—S. humilis—has two such galls. It is a remarkable and suggestive fact, that the remaining willow has no such galls nor anything approaching to them. In numberless localities where this species—S. nigra—grows promiscuously intermixed with S. longifolia or with S. cordata, I have in vain hunted time and again for them, both in the summer and in the winter, when they could be seen with the greatest ease, even if they were only half the size of *S. gnaphalioides*. But for this fact, and the further fact of S. humilis bearing two distinct galls of this peculiar type, we might, from the great similarity of their insects, both in the larva, pupa and imago states, infer that they were all of them merely what I have called Phytophagic Varieties, instead of being specifically distinct, and each confining themselves to their appropriate species of willow.

LARVA.—Undistinguishable from that of *C. s. brassicoides;* breastbone identical and with the same variations. Length .12—.15 inch. width .06—.07 inch. Three specimens. The cocoon is of the usual thin, delicate texture, whitish and about as long again as the larva.

PUPA and IMAGO unknown.

No. 7. **Gall S. cornu.**—On S. humilis. A lateral bud deformed into the shape of a monothalamous, very elongate, slender, cylindrical, tapering, hollow, rigid horn, very slightly pubescent, of a very dark reddish brown color when mature, and with about 12 or 14 longitudinal, pretty regular striæ like a coleopterous elytrum. This gall is .30—.77 inch long, .07—.10 inch in diameter at base and .05—.07 inch close to the tip. where for the length of about .10 inch it is flattened and moderately pubescent, and at the extreme tip, which is rounded, opens by a terminal slit. Sometimes it is solitary, sometimes 2 or 3 of them, or even as many as 10, grow at irregular intervals on a small twig 4 inches long, with a few of the intervening buds in their normal condition. Generally it is perfectly straight, diverging upwards from the twig at an angle of 15°—35°, but occasionally it is a little bent in the middle, and occasionally it curves backwards in a regular curve, so that in one instance the tip nearly touches the base. When cut into, the walls of the hollow are seen to be no thicker than stout paper, but very stiff and hard, and on the terminal ½ the internal surface is pretty smooth with indistinct longitudinal rugæ, except the terminal .05 inch, which is armed with very long, whitish pubescence directed obliquely forwards. In the basal ½ of the horn lies the cocoon, which is closely agglutinated to the walls of the cell except at its tip, where it forms a filmy, whitish diaphragm as in *S. siliqua* n. sp.? The cell formed by the hollow of the deformed bud is prolonged into the woody origin of the bud for .10—.15 inch, but the twig itself is not swelled or deformed, as it is in the allied polythalamous gall *S. triticoides* n. sp., further than by a slight and scarcely noticeable intumescence at the origin of the bud.

Described from 8 living specimens on four different twigs and 10 old dead and dry specimens all on one twig, the whole gathered in November. Out of the 18, 6 or 7 had been bored laterally by some minute parasite, and from at least two of the recent ones parasites had perhaps escaped at the terminal slit, for they contained neither larva nor cocoon, and were unbored, although one of the recent ones was bored. Rare near Rock Island, and difficult to discover from its simulating a short, lateral twig. When these galls occur in great numbers on a twig, the intervening buds perish, but when there are only one or two of them, they do not. When the twig is .08 inch or less in diameter, the part of it which lies beyond the galls shrivels up and perishes, even if there be only one of them, but when the diameter is .13 or over and there is but a single gall, it survives, at all events till the next season.

LARVA.—Sanguineous with yellow bowel-like markings, about .08 inch long and .04 inch wide; breast-bone as in *C. s. brassicoides*, but as in some varieties of that species, with the posterior arm of the Y only about ⅓ as long as each anterior arm, and terminating behind in a square truncation. The cocoon is described under the head of the gall. One specimen, found in November.

PUPA and IMAGO unknown.

No. 8. **Gall s. siliqua**, n. sp.?=*Salicis?* Fitch=*rigidæ?* Fitch, O. S.—On S. humilis (and also on S. cordata? and S. discolor?) A monothalamous, solitary, oval or subspherical, woody gall, .55—1.00 inch long and .20—.34 inch in diameter, growing at the tip of a twig, frequently with several twigs apparently of the same year's growth surrounding it, tapered at tip to a short, blunt, tubiliform beak, which is evidently a deformation of the terminal bud, and hollow inside. The outside surface of the gall, which is the natural color and texture of the bark of the twig, always contains, besides the terminal beak-like bud, 2—5 buds, which are still alive in November in the recent gall but afterwards perish along with the gall itself, as does also, unless the twig on which the gall grows be large, a portion of that twig. Sometimes one of these external buds sprouts out into a twig, growing from the outer surface of the gall, and in a single specimen there are four such twigs. The walls of the internal cell or hollow, including the bark, are .06—.11 inch thick, and lined when mature inside with the cocoon of the gall-maker, which is detached and of the usual delicate texture towards the tip of the hollow, so as to form a kind of diaphragm to exclude any air that might enter through the terminal beak, but is agglutinated strongly to them everywhere else, though it may be detached piece-meal, generally with a thin layer of the greenish woody matter adhering to it. The internal surface of the terminal beak is smooth, continuous with that of the main cell or hollow, and not strongly pubescent at tip as in *S. cornu;* on its external surface there is the natural suture at its base. In one specimen, where a large, abnormal, woody wart had been formed about the middle of the hollow, the larva, instead

of including the wart in his cocoon, had had the remarkable foresight to construct his cocoon entirely above the wart, and was thus compelled to make another diaphragm just above the wart, besides the usual one near the beak, and to lie in a much smaller compass than usual between the two.

Described from 10 living specimens and 27 old and dead ones, all from S. humilis. Rather rare near Rock Island. Varieties of *S. batatas* n. sp. occur, which externally can scarcely be distinguished from *S. siliqua;* but on cutting into them they are seen to be not hollow, but filled with a spongy substance containing several of the cells which are inhabited by the *Cecidomyia* of that polythalamous Gall; and moreover, the terminal bud is not beak-like and tubiliform.

Specimens found on S. cordata in November differ as follows:—1*st.* The average dimensions are about ⅙ smaller, the length in 4 living specimens and 41 dry and dead ones being .45—.85 inch and the breadth .17—.28 inch. 2*nd.* Out of three of the living galls where the *Cecidomyia* was present, there was in two a double diaphragm both at top and bottom of the hollow, instead of the single diaphragm at the top only; but in the other one the diaphragm was single and normal. 3*rd.* The number of buds on the external surface of the 45 galls is 1—3 instead of 2—5. 4*th.* The terminal beak in ⅛ of the above 45 specimens is conspicuously recurved, whereas it is never recurved in those that grow on S. humilis, though it is sometimes a little oblique and in a single specimen is at right angles to the axis of the gall. A gall found August 1 had the beak so much recurved as to touch the side of it, like the tongue-case of the pupa of Sphinx 5-maculata Haw.—From my having in two successive seasons found the old dead and dry galls on both the above two willows at least 8 or 10 times as numerous as the green ones, and from the very weather-worn appearance of many of them, and the fact that a few of them were overgrown and almost obliterated by the twigs that surrounded their base, I infer that they hang on the twig for several years.

A single living gall gathered on S. discolor in November differed from the living ones found on S. humilis as follows:—1*st.* The woody matter composing the outer shell is much thinner than in any one of 14 green specimens off S. humilis and 3 green specimens off S. cordata that I have cut into, being to a much greater extent medially interrupted by a layer of brown spongy matter, so that the gall was rather crushed by the knife than cut by it. *2nd*. Instead of the external surface being plump and of the natural texture of the bark of the twig, it was strongly rugose, when recently gathered, and had much the color and texture of a completely withered blue plum. This does not occur in green specimens found at the same time of the year on the other two Willows, though it is often seen in the old dry ones.—Length 1.00 inch, diameter .30 inch, external buds 3. One specimen.

LARVA.—The larva found in the S. cordata gall with recurved beak August 1 was .06 inch long, bright opaque orange with a ventral and dorsal semitranslucent, polished, broad, orange vitta, and the breast-bone indistinct. A very large specimen from S. humilis examined November 15 was bright sanguineous with yellowish bowel-like markings and the breast-bone as in all the preceding species, except that, as in six others examined November 21, viz: 3 from S. humilis and 3 from S. cordata, the former .13—.17 inch and the latter .17—.19 inch long, it was stouter and blacker, and the two anterior horns of the Y were only ⅔ as long as the posterior part. This seems to be the prevalent variety in this species, none having hitherto occurred that varied *vice versa*, as in all the preceding species, though one or two have occurred with the 3 arms of the Y subequal. Length .23 inch, breadth .07 inch. I have occasionally found specimens both of *C. s. brassicoides* and *C. s. strobiloides* which were similarly elongated not temporarily but permanently; but in this species they are always so. Another specimen from S. humilis examined February 26, was orange-colored, and another from the same willow on March 21, was pale sanguineous orange freckled with bright sanguineous and .18 inch long. By November almost every larva had made its cocoon, which is described under the head of the Gall. The larva obtained in November from the gall on S. discolor was undistinguishable from six specimens found at the same date in galls from the other two willows, except that the breast-bone was larger, blacker and full ½ more robust, being nearly as broad as long. instead of ½ as broad as long. I have, however, since noticed that specimens of *C. s. strobiloides*, &c., occasionally occur which vary in the same manner from the normal type, i. e. in having a much more robust breast-bone.

PUPA. The first pupa (from S. humilis) was found April 12. It did not differ materially from any of the preceding, but the pupal integument (7 specimens) differs most remarkably from those of all my other *Cecidomyia* in the whole of it, except the abdomen, being strongly tinged with fuscous. It would be interesting to know whether Dr. Fitch's species has the same peculiarity. The pupa makes its exit through the terminal beak of the gall, forcing its body halfway out of it and there transforming, or sometimes falling entirely out. Length (from the pupal integument) .17—.19 inch. The pupa from the galls on S. cordata and S. discolor I do not know.

IMAGO. C. S. SILIQUA, n. sp.? ♀—Scarcely distinguishable either in the recent or dried specimen from ♀ *S. rhodoides* though the hair of the thorax is not of so pale a white, as it is in *C. s. strobiloides*, *C. s. gnaphalioides*, and *C. s. rhodoides*. In all the dried specimens, indeed, the legs are tinged with luteous, but so are they in several *C. s. brassicoides*, *C. s. strobiloides*, and *C. s. rhodoides*. The dimensions are also about the same. From *C. s. brassicoides* it differs in the hair of the thorax being whitish, and from *C. s. strobiloides* in the origin of the anterior branch of the 3rd longitudinal vein being pretty distinct. From *C. s. gnaphalioides* it can scarcely be distinguished but by its somewhat larger size, though it is possible that the ♂ ♂ may differ in the average number of their antennal joints. Seven ♀, all bred from the gall of S. humilis; ♂ unknown. From the slight but apparently constant difference, in the galls found on S. humilis and S. cordata, I incline to believe that we have here what I have called a Phytophagic Species in an incipient state of formation. *C. s. brassicoides*, *C. s. strobiloides*, *C. s. gnaphalioides*, *C. s. rhodoides* and *C. s. coryloides* I consider as well and long established Phytophagic Species, and that the way it came about that there are two of them on one willow—S. humilis—namely, the 3rd and 4th species, was, that they migrated ages ago on to that willow from two other distinct species of willow, and therefore, when they finally settled down on S. humilis, their gall-producing secretions had different chemical properties, as we find to be the case in *Cynips q. spongifica* O. S. which is confined to the Black Oak, and *C. q. inanis* O. S. which is confined to the Red Oak, the two imagos of these species being, as in so many *Cecidomyia*, utterly undistinguishable ♂ ♀.

As already stated, (p. 545) there is a gall (Salicis Fitch,=rigidæ O. S.) described by Dr. Fitch as growing upon S. rigida and S. lucida. which seems identical with the above. Through the politeness of A. Agassiz, Esq., I have been favored with a copy of Dr. Fitch's Article on the subject, and also of his drawings, from the *Quarterly Journal of Agriculture and Science*, Vol. I. p. 263. From these it results that the two galls, so far as can be seen, are scarcely distinguishable; and the same may be said of the larva and pupa as described by Dr. Fitch. As regards the imago, he has manifestly—as appears both from the description and the figures of the antennæ, the joints of his ♂ antennæ being figured as sessile and those of his ♀ antennæ as pedicelled—described the ♂ as ♀ and the ♀ as ♂, and mistaken the ♂ anal forceps for an oviduct; and since the ♂ [♀] antennæ are said to be 20-jointed, his statement that the ♀ [♂] antennæ are 16-jointed must surely be either a clerical or typographical error, for in *Cecidomyia* the ♂ always has at least as many antennal joints as the ♀. (*Dipt. N. A.* p. 175.) It is possible, on the assumption that there is no clerical or typographical error here, that he might have bred from these galls the ♂ of some inquilinous species unknown to me, which, like my inquilinous *Cec. albovittata*, had a much smaller number of antennal joints than the author of the gall which it inhabited, and so mistaken it for the other sex of the ♀ that really makes the gall. As will be shown below, the gall-making *C. s. batatas*, which has ♂ antennæ 18—19 jointed, sometimes on S. humilis oviposits on the same twig as *C. s. siliqua*, so that the two galls run together. But no one could mistake the ♂ of that species for the ♂ of *C. s. siliqua*, from its very different size and coloration. After making the necessary allowances, however, I do not see that this imago can be satisfactorily separated from my species. Below will be found, in a condensed form, the leading points in Dr. Fitch's descriptions, omitting such details as are of a generic, rather than of a specific character.

"**Gall Salicis** Fitch (=*rigidæ* O. S.) Plate II. fig. 7.—Formed at the tips of the twigs of several willows growing to the size of shrubs or small trees, of an oval or long ovate form, from ¾ to 1½ inch long, ⅜ inch in diameter at the broadest part, externally red, yellow or greenish brown, being the same color as that of the particular twig upon which it grows. Some of the natural buds of the shrub often occur upon the surface of the gall, as bright and vigorous as they are on the unaffected branches. Frequently one or two twigs grow from its sides, appearing so well nourished and thrifty through the winter season, that we could scarcely deem they were destined to perish the ensuing summer, did not an inspection of the old galls show their similar shoots almost invariably rotten and decaying. Three-eighths of the upper end of the gall is dry, brown and brittle, curving to a point like the kernel of Ergot or spurred rye and protruding from the gall, a well-marked line of separation occurring at the junction of the dead with the lower, living portion. Within, its substance is of a greenish white color and of a soft woody texture. A cylindrical canal, .10 inch in diameter, within which the larva lies, runs from the base of the gall to the apex of the brittle horn at the summit. The extreme tip of the horn is so brittle that it is easily broken by the slightest touch and is rarely found entire.

"**Larva.** Plate II. fig. 3.—A small worm of a bright orange color, with the anterior extremity red, .20 inch long and .08 inch in diameter, of a cylindrical form, slightly tapering and obtusely rounded at both ends, but more so at the posterior than at the anterior extremity. A slightly projecting point perceptible at the apex of the anterior end, and two similar projections at the opposite extremity. The larva is composed of nine segments, each well marked by a contraction intervening at the joints. The anterior or head segment is the largest, and has near the tip on the under side two small black lines, slightly diverging from each other as they proceed forwards. A dorsal row of deep pink spots of a square or trapezoid form on each segment, reaching from its anterior edge about ⅓ of the distance across the segment; a very slender pink-red line reaching backwards from each stigma across the segment; and a similar line from each of the dorsal spots. Other lines of the same color are often visible upon the surface, branching from and anastomosing with these like blood-vessels.

"**Pupa.** Plate II. fig. 2.—The dimensions do not differ perceptibly from those of the larva. The abdominal segments are of the same orange color as the larva; but the future head, thorax and wings are sanguineous-red and lustrous.

"**Imago. Cec. Salicis** Fitch, (=*rigidæ* O. S.) Plate II. fig. 1.—Black, hirsute: wings lurid; venter with white pubescence; legs lurid. Length .18 inch. Expanse wings .35 inch.

"*Head* with a ruffle of fine, velvet-like hairs surrounding its base. Antennæ shorter than the thorax, moniliform, slightly and gradually diminished in diameter towards their tips; joints 20 in number ♂ [♀], each with a few very minute hairs directed forwards, 16 [26?] in number ♀ [♂], each verticillated with longer and coarser hairs. *Thorax* with two impressed, longitudinal lines on the back, slightly converging posteriorly, and densely set with minute hairs: the intermediate space glabrous: sides with longer hairs, most conspicuous and thickly set forward of the wings. *Abdomen* with the posterior edge of each segment marked above by a lighter tinge, beneath chestnut brown, thickly covered with short, white hairs of a silky lustre. Abdomen ♀ [♂] terminated by a slightly exserted, two-jointed ovipositor [♂ forceps] of a cinnamon yellow color. *Legs* glabrous, long and slender, the hinder ones extending .27 inch, of which the tarsi measure .13 inch, blackish above, beneath lurid brown; tarsi black, the first joint very short, the third [second] longest and most slender, the fourth and fifth broadest. *Wings* smoky brown, translucent, the nervures except the anal [3rd longitudinal] rectilinear; the postcostal [2nd longitudinal] longest, running direct to the tip of the wings; the medial [anterior branch of 3rd longitudinal] scarcely confluent with the inner margin at ¾ the distance from the base to the tip, towards its base becoming a mere plait-like trace upon the wing, and at the first glance seeming to be a branch of the anal nervure [3rd longitudinal.]"

On comparing the average dimensions of Dr. Fitch's gall with those of the gall found by myself on S. humilis, the former averages 1.12 inch long and the latter only .77 inch long, and the diameter of the former is given as .37 inch while the average diameter of the latter is only .27

inch. The difference becomes still greater if we compare the average dimensions of the gall found by myself on S. cordata. Again, Dr. Fitch gives the length of the terminal bud or beak, which, as he correctly observes, is divided by "a well-marked line of separation" from the rest of the gall, as ⅜ of the length of the entire gall. In three freshly gathered specimens from S. humilis, where the terminal bud is perfect and uninjured, I find that it only averages .28 of the length of the entire gall instead of .37 (=⅜), and I am satisfied that these three were fair average specimens, from comparing them with those used in my descriptions. On measuring Dr. Fitch's figure, I find that the bud is .35 of the length of the entire gall, thus proving that the comparative length of the bud, .37 or ⅜, given in the text, cannot be typographically erroneous.

From the description of the larva as 9-jointed, it would appear that Dr. Fitch considered the last bi-tuberculated or anal segment as a mere anal process, and the three thoracic segments, (which in *Cecidomyia* are never so clearly separated from each other as the abdominal segments,) as forming, together with the minute true head which is very generally retracted, and which is no doubt the "slightly projecting point" in the text, an enormous head or "head segment," bearing "near the tip on the under side two small black lines," which are manifestly the breast-bone. By thus deducting 4, viz: the anal and the three thoracic segments, from the real number of segments, viz: 13, including the head, we obtain the required number, 9.

In the description of the imago there is nothing said as to the ♂ (♀) antennæ being pedicelled, but the figure, though rather rough, represents them with pedicels about ½ as long as the joints, and the verticels about as long as two complete joints, just as in the ♂ of all the allied species. So near as I can guess at the number of joints in ♀ antennæ of my species, I should say they are 21 (2+19); but, as already stated, I find it hard to count the joints of the ♀ antennæ in the Willow *Cecidomyia* with precision, from the terminal ones being so closely united. The ♂ of my species is unknown to me, so that I cannot compare it with the ♂ of the other form. Strictly speaking, as Dr. Fitch gives "black" as the ground-color, and says nothing of the color of the hairs of the thorax, they ought to be black, whereas in my species they are grayish white. Probably, however, this was a mere oversight, or a clerical or typographical error, like the statement that the *third* joint of the tarsi is "the longest and most slender," whereas in all true *Cecidomyina* it is the *second* joint that is by far the longest of the five. The dimensions, including those of the legs, agree exactly. Harris incorrectly gives the length as "a little over .20 inch," and the alar expanse as "rather more than .30 inch," (*Inj. Ins.* p. 567.) which makes the expanse proportionally too little by nearly .08 inch, taking Dr. Fitch's measurements as the standard of comparison.

No. 9. **Gall S. triticoides,** n. sp.—On S. cordata. A polythalamous, woody gall .70—1.23 inch long and .30—.37 inch in diameter, bearing a remote resemblance to a head of wheat with the kernels elongated, naked, pointed and very protuberant, its general outline oval or elongate-oval, and formed by the swelling of a twig to 2 or 3 times its former diameter, the swelled portion being very much contracted longitudinally, so as to bring each kernel-like bud nearly or quite into contact with the base of the one that precedes it in the same row, the whole number being arranged in 4 irregular rows. Besides the swelling of the twig itself, the origin of each bud is also swelled into a more or less large tubercle, inside which is excavated longitudinally a cylindrical, slightly rugose and moderately polished cell, .25—.27 inch long and .06 inch wide, the bud itself being elongated to about .17 inch and deformed so as to become a beak-like, tubiliform continuation of the cell, without any suture on the inside intervening, moderately polished inside like the woody part of the cell, and without pubescence as at the interior tip of the cell of *S. cornu* n. sp. Through a slit at the tip of this beak-like bud the maker of the gall escapes, while, as usual, the parasite that preys on the gall-maker bores through it laterally. Above the gall the twig generally shrivels to about ½ its natural diameter, but occasionally where there are only a few cells—say 7 or 8 instead of 15 or 16—it is not very materially diminished in size.—Described from 3 dead and dry specimens. Very rare near Rock Island.

LARVA, PUPA and IMAGO are all unknown; but from the structure of this gall being so exactly like that of *S. siliqua* n. sp.? and especially *S. cornu* n. sp., there can be no doubt that it is, like those two galls, the work of a *Cecidomyia*. Inside several of the cells I found cocoons similar to those of *C. s. strobiloides*, &c., but much longer in proportion to their diameter, and not glued to the walls of the cell as in *S. siliqua* and *S. cornu*, so that I was able after relaxing the gall to extract two of them entire. They measured when extracted .42—.44 inch in length and .06 inch in diameter, thus occupying the entire length and breadth of the cell including the beak formed by the bud. In the bottom of many of these cells, where the beak-like bud was bored laterally, I found an empty cocoon very similar to that of a parasitic

Proctotrupide which occurs in the imago state in November in the central cell' of *S. strobiloides* O. S.; and in these cells there was no Cecidomyidous cocoon, as is also sometimes the case in the cells of *C. s. strobiloides* that are occupied by the above Proctotrupide.

No. 10. 'GALL S. HORDEOIDES n. sp.—On S. humilis. This gall has some resemblance to a beardless ear of four-rowed barley, and differs as follows from *S. triticoides:—1st.* The twig on which the cells are placed is not materially enlarged and is of a uniform diameter throughout. *2nd.* The twig is abnormally shortened as in *S. triticoides*, but only so that the tip of each deformed bud touches or nearly touches the base of the one that succeeds it in the *adjoining* row, instead of the base of the one in the *same* row. *3rd.* The entire cells are only .20 inch long, instead of .42—.44 inch, and they extend only .05 inch, or ¼ of their entire length instead of 3-5ths of their entire length, into the woody origin of the bud, the deformed buds being not much elongated, but hollow and, as well as the woody part of the cell, polished internally. *4th.* The woody origin of the buds is scarcely swelled and protuberant.—Described from one dead and dry specimen, 1.40 inch long and .10 inch in diameter. It contains 10 deformed buds, regularly arranged with no undeformed ones intervening, as is the case in the monothalamous gall *S. cornu*, when several of them grow near each other. As in some *S. triticoides*, the tip of the twig has completely shrivelled up and perished. Easily distinguished from the monothalamous, Tenthredinidous gall, *S. gemma* n. sp., which occurs on the same Willow, by there being no normal buds between the affected buds, and by the buds themselves not being abnormally swelled out laterally, and being hollow, not solid, inside. But for the fact of several of the deformed buds having been bored by minute parasites, I should never have suspected this specimen of being what it most undoubtedly is—a true Cecidomyidous gall; and but for its strong homologies with *S. triticoides*, I should hesitate whether to consider it as a congeries of solitary galls, like *S. cornu*, or a true polythalamous gall, where the twig itself is swelled and deformed and converted into a gall, like *S. triticoides*. It must be very difficult of discovery, when it is recent and the cells are unbored by any parasites.

LARVA, PUPA and IMAGO unknown.

No. 11. **Gall S. nodulus**, n. sp.—On S. longifolia. A small, monothalamous, woody gall, sometimes terminal but generally not so, scarcely ever including

any buds, growing on twigs .05—.15 inch in diameter, variable in shape, but generally consisting of a mere oval enlargement of the twig to half as large as its normal size for the length of .20—.50 inch. The surface of the enlargement is either the usual color of the bark, or simply discolored and dark, or a little roughened with brown scales and longitudinally sinuate and interlacing striæ. Occasionally it assumes the form of an elongate, lateral, bunnion-like swelling about .27 inch long and .13 inch wide, as in some varieties of *S. batatas* n. sp., and in one specimen there occurred an intermediate grade between this variety and the normal type; occasionally it grows at the base of a very small side-shoot, when the tip of the side-shoot shrivels up and perishes; and occasionally the growth of the side-shoot is completely arrested, and the gall becomes a mere obhemispherical swelling about .20 inch in diameter, with its upper surface in an irregular plane, and very rugose and brown, located at the spot where normally there ought to be a bud. On cutting into this gall in November, it is found to contain a single cell—smooth on the inside when the gall-making larva is present, but, as in *S. batatas*, without any separate cocoon—and much reddish-brown matter where the larva had formerly burrowed, and occasionally some grass-green soft matter; but the external walls are still in their normal white, ligneous state, the larva having apparently confined itself to the pith and the wood immediately surrounding the pith.

Described from 9 specimens. Rare near Rock Island. Externally this gall cannot be distinguished from the smaller varieties of *C. batatas*, but the former is monothalamous, the latter polythalamous; neither can it be distinguished, except by its much smaller size and its much smaller cell, from the Tenthredinidous gall *C. nodus* which grows on the same willow. Of the 9 galls examined, 7 were unbored, 3 of which contained each a single larva of *Cec. s. nodulus*, 1 a single hairy Chalcididous larva, probably a *Callimome*, 1 a single Curculionidous larva, no doubt an Inquiline, and in 2 the gall-making larva was absent and must have perished in early life, for although its work was plainly visible yet the gall was not bored. In none of the 9, whether bored or unbored, had the twig been killed, except in the very small gall before referred to, where the terminal bud had sprouted out into a minute shoot which afterwards perished. The smallness of this larva and there being only one in each gall, readily account for this otherwise anomalous fact.

I found Dec. 1st in one of these galls, which had been bored by a single hole and contained no Cecidomyidous larva, a minute Lepidopterous larva, doubtless an inquiline, and over a dozen small and young *Aphis*, which had probably taken refuge there for the winter. May not Hartig have been deceived by some such case as this into supposing, that certain European Willow-galls were the work of *Aphis?* (See above, p. 551.) On July 31st I found a bored and empty specimen of the Tenthredinidous gall *C. pomum* tenanted in the same manner by over a dozen *Aphis*.

LARVA. The larva in November is of a bright, shining, orange color, immaculate, with the segments much hunched, .07—.10 inch long and from 3 to 4 times as long as wide. The breast-bone is clove-shaped and exactly like that of *C. batatas*, but on comparing 10 specimens of that species there can be no doubt of their specific distinctness. For the larva of *C. s. nodulus* differs from that of *C. s. batatas*, 1st in being much more elongate, 2nd in being immaculate with sanguineous, 3rd in being unusually shining and the segments more hunched than in any Willow-gall *Cecidomyia* known to me except *C. s. siliqua*.—Described from 3 specimens.

PUPA and IMAGO unknown.

No. 12. **Gall s. batatas** n. sp.—On S. humilis, (S. cordata? and S. discolor?) A polythalamous gall of very variable shape and size, pale green when young, the color of the bark when mature, growing on twigs .06—.19 inch in diameter, almost always some distance from the tip of the twig. Sometimes it resembles a small kidney-potato pierced lengthways by a twig, and has then most generally a smooth, polished surface studded with a few buds, one or two of which occasionally give birth to a shoot, and it then reaches 1.35 inch in length and .60 inch in diameter. Sometimes it resembles a young apple pierced lengthways by a twig, and it then attains a diameter of .50 inch. Sometimes it forms a hemispherical or hemielliptic swelling, like a bunnion, on the side of the twig and attains a diameter of .30 inch. Sometimes all these different shapes are strung together one after the other in more or less close proximity, on the same twig. Sometimes it is reduced to a small, elongate-oval enlargement of the twig for ½ or ¾ an inch; and occasionally it becomes so irregular and so full of side-shoots, bulges, cracks, roughnesses and lobes, as to defy description. Very rarely it is terminal and assumes the form of *S. siliqua*, but may be distinguished by the terminal bud not being elongated and tubiliform, and by being solid and not hollow inside. On one occasion I found what had evidently been a *S. siliqua* gall, occupied laterally by spongy matter containing 4 larvæ undistinguishable from those of *C. s. batatas*, the elongated cell of the larva of *C. s. siliqua* being still in existence but contracted in diameter and empty. When these galls assume the elongate bunnion-like form, they are undistinguishable externally from the Tenthredinidous gall *S. ovum*, which occurs on S. cordata, and *S. ovulum*, which occurs on the same willow as *S. batatas*, but may be distinguished on cutting into them by the fibres being linear and radiating from the twig, whereas the other two galls are composed of a series of spongy lamellæ at right angles to the axis of the twig, and moreover, when laid open to their base, exhibit the longitudinal slit made by the ovipositor of the mother Saw-fly. The smallest galls above referred to are only .15 inch in diameter; but there is a regular gradation from these to the larger and more conspicuous forms, and by isolating a number of the first in a separate breeding-jar, I ascertained that they produced the same *Cecidomyia* (7 specimens April 7—May 10) and the same 3 parasites, viz. 2 Chalcidides and 1 Proctotrupide. When cut into about the last of July, the interior of this gall to the depth of .07—.10 inch from the surface, is found to be white and fleshy; when cut into in the autumn or early in the spring, the substance of all but the very smallest, which are almost entirely woody and whitish, is found to be reddish-brown and of a dense, spongy texture, with indistinct fibres radiating from the twig. Some little distance from the external surface there are at this time a number of cells, about ¾ of them tenanted by white, parasitic larvæ, some hairy and some glabrous, belonging to the Chalcididous genera *Callimome* and *Decatoma* (?), and about ¼ of them tenanted by the orange-colored larvæ of the Gall-gnat which originates the gall. In 3 or 4 instances I have seen the gall *S. gnaphalioides* growing sessile from the tip of *S. batatas.*—Described from 100—150 specimens. Very common near Rock Island on S. humilis.

In galls similar to the last mentioned, small, elongate-oval galls, but growing on S. cordata, I found May 9 a larva undistinguishable from that of *C. s. batatas* and with the same breast-bone, but did not succeed in breeding the perfect Gall-gnat, though I obtained many *Chalcididæ* from these galls identical with two species bred copiously from *S. batatas*, one of which—a Decatoma (?) with spotted wings—has hitherto occurred in no other gall, though a similar species infests *Cynips q. spongifica* and other gall-flies.

In November I found on *S. discolor* 8 galls, apparently identical both externally and internally with the *S. batatas* found on *S. humilis.* 3 old and dry ones of the normal form which were all bored and strung along on the same twig, and 5 green and recent ones of the lateral. bunnion-like type on two different twigs. Their diameter was .19—.40 inch. From the recent ones I obtained 6 larvæ, which when compared with 6 taken from galls on S. humilis differed in no respect. In the preceding spring I had obtained 2 or 3 similar galls of the bunnion-like type from the same bush, from which I bred a large *Microgaster*, whence I infer that some lepidopterous larva had been living as an Inquiline in one of them, as the parasite was much too large to have lived in the body of *C. s. batatas*, and besides I have met with no instance of Ichneumonidous insects being parasitic on *Cecidomyia.* I found at the same time several galls on the same bush, which, as has been stated to be sometimes the case in *S. batatas*, assumed the form of a slight, elongate-oval enlargement of the twig; but from these I bred nothing. On the whole, further investigation will be required to determine, whether the imago produced from these galls on S. cordata and S. discolor is identical with *Cec. s. batatas*. It is rather singular, that in these S. discolor galls I found no larvæ at all of the Decatoma (?) and Callimome, which so greatly outnumber the larvæ of *C. s. batatas* in the S. humilis galls.

It is worth remarking, that the only two Cecidomyidous galls which appear to grow on more than one species of our Rock Island Willows—viz. *S. batatas* and *C. siliqua*—occur on as many as three species of them, and that these three species should in both cases be the *same* three, viz. S. humilis, S. cordata and S. discolor. The chances are very greatly against such an event happening, without some good and sufficient cause for it. Mr. Bebb informs me that there is a close alliance between S. humilis and S. discolor; but that neither S. cordata (=S. rigida) nor S. lucida is allied to the first two. While on this subject I may say that Mr. Bebb has re-examined the doubtful species of Willow referred to above (p. 546), and has concluded that it is certainly neither S. nigra nor S. alba, and that it is not improbably S. fragilis Lin., a species which has been introduced into N. A. from Europe.

Larva.—July 24 and 30 the larvæ were orange-colored, .09 inch long and with a slender, black, clove-shaped breast-bone, and some of them with curdy, bowel-like markings above and below. The surface of the cell was then opaque and rather rough and scaly. Nov. 11 and subsequently the surface of the cells was smooth, the cocoon apparently adhering to their sides but being scarcely separable except piece-meal. Larvæ from 12 to 20 in number examined at various times in November were .08—.10 inch long and .04—.05 inch wide, not shining but rather opaque as in most of the preceding, except *C. s. nodulus*, of a sanguineous color with dominant, bowel-like, yellowish markings, which are situated mostly between the sutures, the sanguineous color generally forming a wide dorsal vitta, widely interrupted between the sutures on each joint. Breast-bone coal-black, clove-shaped, the head of the clove towards the mouth, 1-4—1-5 as long as the whole breast-bone and composed of two short, robust, acute branches, which are divergent at base but afterwards run parallel to each other, with an appearance often of another lateral branch on each side. The stem of the clove is straight, uniform in breadth except that it is minutely clavate at base, and 4—5 times as long as broad; and the whole breast-bone is half as long again as one of the middle abdominal joints. Feb. 26 and 28 the insect was still in the larva state, and was then deep orange-color almost sanguineous; and a specimen occurred in that state even as late as April 23.

Pupa.—The first pupæ were found March 16 and others were noticed up to April 15. Those first noticed were all bright sanguineous; the last, which were probably just about to transform, had the abdomen dull luteous and the rest of the body, including the legs, blackish. The horns at the base of the antennæ are long, elongate-conical, about ½ as long as the diameter of the thorax, diverging from each other at an angle of about 45° and terminating in a short thorn. The thoracic bristle is ½ as long as the diameter of the thorax, and is both in the living and the dried specimen basally whitish but terminally black.—Length (1 specimen, dried) .10 inch.

The pupal integument (21 specimens) is whitish, the head and antennæ, but not the wing-cases, very slightly tinged with dusky, and the thoracic bristles and the tips of the antennal horns conspicuously black. The pupa, just before transforming into the imago, works ½ its body out of the gall and generally transforms in that position, but sometimes loses its hold and falls entirely out. The horns at the base of the antennæ are no doubt elongated in this species, and as shown by their color in the pupal integument terminally thickened, to enable it to bore its way out through the sponge of the gall, whereas all the preceding species, with the single exception of *C. s. nodulus*, the pupa of which is unknown, merely have to bore through the filmy substance of their cocoons. They are still longer and in the pupal integument entirely black in the inquilinous *C. cornuta* n. sp., which has to bore its way out through the wood of the willow twig in which it resides.

Imago. **C. s. batatas** n. sp.—♂ ♀ (Recent.) Pale reddish-brown, or reddish-brown, or umber-brown, or brown-black, paler beneath. *Head* with its posterior surface dusky; antennæ ♂ about ¾ as long as the dried body, 18—19 jointed (2+16 to 2+17), the last 2 or 3 joints without any distinct pedicel, the antenna otherwise constructed precisely as in ♂ *C. s. brassicoides.* Antennæ ♀ not quite ½ as long as the dried body exclusive of the oviduct, with apparently a joint or two less than the ♂, the joints difficult to count, otherwise as in ♀ *C. s. brassicoides.* *Thorax* with a row of whitish hairs in each longitudinal stria, giving the appearance of two whitish vittæ, and with irregular lateral whitish hairs, the three interstices glabrous. Origin of wings and a large spot beneath them orange-color or sanguineous, in the dried specimen dull rufous. Halteres pale, the club often a little obfuscated. *Abdomen* ♀ above and below sanguineous with short whitish hairs and generally a lateral subterminal tuft of longer whitish hairs on each joint of the dorsum; sometimes in the more mature specimens with a broad vitta of short, brown hairs covering nearly the entire dorsal surface and the lateral hairs whitish with a definite dividing outline; sometimes with the sanguineous color of the entire dorsum completely concealed, except at the sutures, by short, brown hairs and the oviduct also brown. Oviduct sometimes protruded so as to be ¾ as long as the other part of the abdomen, sometimes so as to be only ⅓ as long. Abdomen ♂, unless my memory fails me, luteous when recent, otherwise much as in ♀. *Legs* (dried) silvery white or yellowish white with the superior surface, especially towards the knees, and also the tips of the tarsi, sometimes strongly, sometimes scarcely, blackish. *Wings* slightly tinged with dusky from minute, appressed, dusky hairs, in 3 ♀ (both recent and dried) tinged with brown throughout, in 2 ♀ (both recent and dried) tinged with brown towards the tips. The costal vein generally coarse and brown black, sometimes finer and the color of the wing. The cross-vein between the 1st and 2nd longitudinal veins obsolete. The 2nd longitudinal vein scarcely recurved at its tip. The anterior branch of the 3rd longitudinal vein distinct throughout, and springing from that vein at an angle of about 135° for a very minute distance, when it suddenly curves round and assumes such a direction, that it appears at first sight to be a continuation of the main vein rather than a branch of it; and it is scarcely recurved at tip, proceeding nearly in a straight line, till it almost attains the margin, when it fades out.—Length (dried) ♂ .08 inch, ♀ (including oviduct) .10—.18 inch. Length wing ♂ .13 inch, ♀ .11—.13 inch.

Two ♂, forty-one ♀. In this species, unlike all the preceding, the abdomen ♂ ♀ retains its colors very tolerably in the dried specimen. The ♀ ♀ very greatly outnumbered the ♂ ♂, and the ♀ ♀ came out April 8—May 10 and subsequently, and what is unusual in insects the ♂ ♂ not till long after the ♀ ♀, or the last of April and the beginning of May. Mr. Edwards has remarked to me that in many species of butterflies the ♂ ♂ make their first appearance several weeks before the ♀ ♀, and I have observed the same thing myself, not only of several butterflies, e. g. *Nathalis Iole* Bdv., but of many other insects belonging to different Orders, and believe it to be a general, though by no means a universal rule. This species differs from the inquilinous *Cec. albovittata* n. sp., which infests this as well as several other Willow galls, in its much larger size, and in the ♂ antennæ being 18—19-jointed instead of 14—15-jointed, and in the comparative shortness of their pedicels. In other respects the two species, even when recent specimens are placed side by side, cannot be distinguished, except by a recondite character in their venation. From the inquilinous *C. orbitalis* n. sp., which infests this and several other Willow galls, it is easily distinguishable when recent by the posterior surface of the head being uniformly dusky and showing no white ring round the eye. From both species the pupa is at once separated by the very elongated horns at the base of the antennæ. My other inquilinous species are quite distinct.

I have observed in two successive autumns, that many of these galls. especially the large, potato-like ones, are already bored by holes of the same size as those made by *C. s. batatas;* and on placing a large number of such bored galls next spring in a separate breeding-jar, I obtained from them in considerable numbers the same 3 parasites which I bred at the same time in very large numbers from the unbored galls, but no *Cecidomyia.* Hence I infer either, 1*st.* that a few *C. s. batatas* come out in the autumn and the rest not till the following spring, which actually occurs with the Wheat-midge, (see above p. 568), and is a common thing with many other insects, or 2*nd.* that the species is double-brooded like the inquilinous *C. albovittata* n. sp., which is contrary to the analogy of the other Gall-gnats of the Willow and does not harmonize with the fact of the bored and unbored galls producing the same identical 3 parasites, or 3*rd.* that there is some parasite or inquiline, hitherto undiscovered by me, which infests these galls and whose natural time for assuming the imago state is in autumn. Of these three hypotheses, which are all possible, I decidedly incline to the first.

No. 13. **Gall S. verruca,** n. sp.—On S. humilis. A small, monothalamous, irregularly spherical, greenish yellow gall, .07—.13 inch in diameter, growing the latter end of August from the midrib or some of the principal veins of the leaf, half of it projecting from each side of the leaf. The upper side is flattish or with a minute point or nipple, the lower side branches out into a ragged, wart-like excrescence, whence the specific name, which later in the season bursts open so as to afford an exit to the insect. When cut into in August, the external wall of a few galls is found to be rather woody, enclosing a central cell, in which lies the larva; but the majority of them are still solid. From 1 to 12 are found on a single leaf, several of them being often confluent, but with their internal cells, when they have any, separated by a thin partition, and with separate warts to each on the under side of the leaf, which afterwards open separately. Rather abundant, but local near Rock Island. Described from 38 affected leaves.

Larva.—By August 26th, in a few of the galls, the larva is .07 inch long, of the usual oval shape, orange-colored, and with the breast-bone suborbicular, small and indistinct. In the others the larva is not developed, nearly the whole interior of the gall being solid. Those that I attempted to breed all dried up inside the gall before November, the leaves having been kept too dry; but from the structure of the gall itself and the analogy of similar Cecidomyidous galls on the oak, (*Symmetrica* O. S. and *Quercus pilulæ* Walsh,) I infer that they go under ground to transform into the pupa state.

PUPA and IMAGO unknown.

No. 14. **Gall S. semen,** n. sp.—On S. nigra. A minute, monothalamous, hollow, irregularly hemispherical, greenish yellow gall, .02—.04 inch in diameter, mostly on the upper side of the leaf, and often, but not always, with a pointed nipple on the middle of the hemisphere, always with a corresponding circular depression on the other side of the leaf, in the middle of which is a very minute, flattish hemisphere. Very frequently on one and the same leaf the position of the gall is reversed from the upper to the lower side, as in Q. *pilulæ* Walsh. On a single leaf scores of them may often be counted, generally with several masses among them, composed of two or more confluent galls. Commences its growth early in the summer, and by the last of August many are found to be burst open at top, yet at the same time very many of them, when opened, are found to be solid without any central cell. By November most of the galls from which I attempted to breed the insect had burst open into a ragged, wart-like shape on the hemispherical side, but no larvæ had escaped from them and none were discoverable in them. As the leaves were kept too moist, so that they moulded badly, the larvæ had probably perished in the galls.

Described from 20 affected leaves. From its close homology with the much larger oak-galls *Symmetrica* O. S. and *Q. pilulæ* Walsh, in the former of which Cecidomyidous larvæ were detected by Osten Sacken, and described (*Dipt. N. A.* p. 201) as having a Y-shaped breast-bone, and in the latter of which I found myself, September 14th, several orange-colored larvæ, which, from the presence of a clove-shaped breast-bone, were undoubtedly Cecidomyidous, and from the fact of a similar leaf-gall on a Willow, *S. verruca* n. sp., being inhabited by a Cecidomyidous larva, there can be no doubt, I think, that the gall *S. semen* is the work of a Gall-gnat. Prodigiously abundant and very common everywhere in Rock Island County, Illinois, on the Black Willow, the foliage of whole trees being thickly frosted over by it, so that the leaves look like nutmeg-graters. I have in a cursory manner noticed in July several specimens of what seemed a very similar gall on S. discolor, but found no larvæ in them; and in a single instance I found, August 20, two leaves of S. longifolia on a twig which grew out of a bunch of the galls *S. brassicoides*, covered so densely with somewhat similar galls as to be intermediate in appearance between *S. semen* and *S. ænigma*. On August 29 I discovered in one of the cells of this gall a minute, pale-colored, apod larva with a large, scaly head, and the disk of its dorsum, but not of its venter, fuscous. This so exactly resembled a much larger larva of which I have found many specimens in the Cecidomyidous gall, *Q. pilulæ* Walsh, and which I am sure, from comparing it with the larva of *Anthonomus scutellatus* Schönh., must be Curculionidous, that I believe it to be also Curculionidous, and inquilinous, like the other larva, in the gall where it occurred.

I have noticed towards the last of August galls about the size of the head of a large pin, similar to *S. semen*, and often similarly confluent, growing in considerable abundance on the leaves of the River Birch (Betula nigra), chiefly or almost entirely on their upper surface. And on the leaves of the Button-bush (Cephalanthus) I have noticed at the same period of the year galls of the same character, in the same luxuriant profusion as *S. semen* occurs on the Black Willow, whole bushes being covered with them; but in neither of the two kinds could I discover any larvæ. I believe them both to be the work of *Cecidomyia*. It does not follow, because all these galls are so small, that therefore their Gall-gnats must be abnormally small. The gall *S. rhodoides* n. sp. is about 4 times as long and wide as the Gall *S. gnaphalioides* n. sp., yet the Gall-gnat produced from the latter is only ¼ shorter than the Gall-gnat produced from the former.

LARVA, PUPA and IMAGO unknown.

No. 15. **Gall S. ænigma**, n. sp.—On S. nigra. A polythalamous, crumpled, irregularly spherical or ellipsoidal mass, something like the aborted mass of flower-buds of a common cauliflower, but with a more ragged and uneven surface, .30—1.10 inch in diameter, and growing almost sessile or sometimes on a stem as long as .50 inch, which is often branched and much flattened or distorted, from the side or occasionally from the tip of twigs .05—.30 inch in diameter. When cut into early in the summer, there is seen to be no regular heart or symmetrical arrangement of the parts, as there is in all monothalamous galls, and the stem is crisp and rather fleshy than woody. This gall first appears early in June, being chiefly a deformation of the flower-catkins, but occasionally, unless I was deceived from confounding it with *S. semen* n. sp., which I think must have been the case, of the leaves. At that time, and for a month or two afterwards, it is of a pale green, but long before autumn it dries up and becomes brittle and of a dark ash-gray color, without, however, losing its original shape, and hangs on the trees till long after the next spring opens. It contains, so far as I could discover, no regular cells, but the larvæ of the Gall-gnat appear to burrow irregularly in the main stem and its branches. On the same twig may often be seen 6 or 8 of these galls at irregular intervals of half an inch or 1½ inches, and frequently two of them grow side by side and run together. Whole trees are sometimes so covered by them, that the galls seem almost half as numerous as the leaves. As usual, the twigs, unless very large, are killed by the presence of these galls shortly after the galls have become mature. Described from 150—200 specimens. Very common and abundant everywhere in Rock Island County, Illinois.

LARVA.—On June 19 the larva, or what I took to be the larva, of the gall-maker was small and barely visible in the stem of the gall, but the place where it worked was discolored and brown. On August 19, from about half a gallon of galls, which had been gathered only 5 or 6 days before, there came out about a dozen larvæ, apparently with the intention of going under ground, and after some considerable search I discovered one inside the substance of the stem of a gall. No others came out subsequently, so far as I observed, from that large mass of galls; and if many of them had come out they could scarcely have escaped notice, for there was nothing in the breeding-jar but the galls themselves, and no earth at the bottom of it. Those that came out were .05 inch long, rather elongate, and with the head more porrect and pointed than is usual, except in the larvæ of *C. s. siliqua* and *C. s. nodulus*. The breast-bone was rather indistinct, but seemed to be about twice as long as its basal width and tapered to ½ the basal width at tip. Repeatedly at other times during the season I had cut into these galls, both at home and in the field, and always failed to find Cecidomyidous larvæ in them, though I sometimes found that of an inquilinous Lepidopteron. It is possible that the above larvæ might also have been inquilinous; but if so, where were the *Cecidomyia* that really made the galls? I am persuaded that the gall is really Cecidomyidous, because, 1*st*, I obtained from them the same Lepidopterous imago that I obtained in great numbers from the Cecidomyidous gall *S. brassicoides* n. sp.;* 2*nd*, I noticed on them in considerable numbers, and both in the larva and imago states, the same Heteropterous insect—*Anthocoris pseudochinche* Fitch—that occurs also in great numbers on the Cecidomyidous gall *S. brassicoides* n. sp., and in less numbers on the Cecidomyidous galls *S. rhodoides* n. sp. and *S. strobiloides* O. S.; 3*rd*, As already stated (p 551) I believe that all Willow Galls are either the work of Gall-gnats or of Saw-flies, and the larvæ of Saw-flies being comparatively large and conspicuous, if *S. ænigma* was a Tenthredinidous gall I must have found some Tenthredinidous larvæ in it, so often as I dug into it; whence by the method of exhaustion it follows that it must be a Cecidomyidous gall.—As on June 19 I noticed on these galls the larva of a large *Thrips*, and a few others subsequently in the imago

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*The species here referred to belongs, according to Dr. Clemens, to *Tortricidæ*, but has not as yet been described by him. It is remarkable for varying in the most surprising manner, and I sent Dr. Clemens a very large series of all the variations.

state, it is not improbable that this insect may puncture and destroy the great majority of the *Cecidomyidæ*, that originate the gall, either in the egg or the very young larva state, for which purpose its very elongate, horny, setiform mandibles, which Haliday described as "having a bulbous base and by their junction towards the tip forming a 2-valved siphon," seem to be admirably adapted. (See Westw. *Intr*. II. p. 2 and p. 1. fig. 4.) The whole subject of the great paucity of Cecidomyidous larvæ in this and other allied galls is a mystery at present. and requires further and fuller investigation. The only other insects that I noticed on or in these galls, besides those already referred to. none of which could be insectivorous, were a single Coleopterous (?) larva, pedate and ½ an inch long, on August 17, which I failed to rear to maturity, and a single imago of the Coleopterous *Litargus 4-spilotus* Lec., which I bred from them on August 30, and which evidently could not have been insectivorous. It is proper to add, that I did not replace the galls in my breeding-jar during the summer by fresh specimens so often as I should have done, in order to become thoroughly acquainted with their Natural History; and that it is therefore quite possible that a considerable number of larvæ may have escaped from the galls on the trees shortly before August 14. (See above p. 574.)

It is well known that Economic Entomologists have been greatly exercised, to account for the cause of the affection of the leaves of the Peach-tree known in the East as "the curl." Some have attributed it to the action of *Aphis*, and others partly to *Aphis* and partly to other unknown causes. (Harris *Inj. Ins*. p. 240, and *Rep. Pomolog. Soc.* p. 4; Fitch *N. Y. Rep*. II. p. 63.) I am myself unacquainted with the phenomena of "the curl," as the disease does not appear to prevail in the Valley of the Mississippi; but Harris describes it as "irregular and crisp tumors, often of a reddish color and of a spongy texture, formed of thickened and succulent cellular tissue, and presenting some analogy to the warts [Black-knot] of the Plum-tree." (*Rep. Pom. Soc.* p. 4.) May it not be possible that it is a polythalamous gall like *S. ænigma* n. sp., and like that gall the work of a *Cecidomyia?* It presents some rather striking analogies with certain galls known to be Cecidomyidous 1*st*. As in *q. pilulæ* Walsh, the tumors are red. 2*nd*. As in that gall and in *S. verruca*, *S. semen* and *S. ænigma*, the great majority of the tumors, when opened, even at a late period of the year, are solid and contain no cell and no visible larva. What is the cause of this phenomenon I cannot say with certainty, but I suspect that the egg or the very young larva of the Gall-gnat is to a great extent destroyed within the gall by being punctured and sucked by some insect foe, and that that foe probably belongs to *Thripidæ*.* Authors have hitherto always considered this remarkable Family as vegetable-feeders, but from many facts which I have observed, one of which I have recorded *Proc. Ent. Soc. Phil.* I. p. 310, I believe that they are generally, if not universally, insectivorous, and that those that occur on the ears of the wheat, both in the U. S. and in Europe, are preying there upon the eggs or larvæ of the Wheat Midge (*Cec. Tritici*), and are consequently not the foes, as has been generally imagined, but the friends of the farmer. In confirmation of these views, it may be remarked, that the very same species (*Thrips cerealium*), which has been stated by all European authors to attack the *ears* of the wheat, was found by Vassalli Eandi in Italy "to gnaw the *stems* of the wheat above the knots and cause the abortion of the ear." (See Westw. *Intr*. II. p. 4.) Is it probable that the same species should attack the same plant in two such very different parts? I believe that the Italian *Thrips* were attacking Hessian Flies (*Cec. destructor*), or some such wheat-destroying insects that inhabit "the stem above the knots," and that it was these last, and not the *Thrips*, that caused the "abortion of the ear." The *Thrips* that were supposed to do so much damage in Wisconsan, as related by Dr. Fitch, (*N. Y. Rep*. I. p. 304), were said to attack both the blossoms of the wheat

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*Dr. Fitch, perhaps because Dr. Harris had seen fit to alter the *Aphidæ* of preceding authors into *Aphididæ*—which may or may not be right, according to whether we consider the analogies of the noun *Aphis* to be with the Greek *Chrysis* or with the Latin *Apis*—asserts that the *Thripidæ* of preceding authors is incorrect and ought to be written *Thripididæ*, and adopts that anomalous orthography himself. (*N. Y. Rep.* I. p. 305.) Scientific names are generally sufficiently long, without interpolating unnecessary syllables, and in this case the interpolation is manifestly not only unnecessary, but solecistic. *Thrips* is a genuine Greek word, with a genitive case *Thripos*, from which is regularly derived the patronymic form *Thripidæ*, just as from the Greek noun *Sphinx*, genitive case *Sphingos*, comes the patronymic *Sphingidæ*. We might as well write *Sphingididæ* as *Thripididæ*. It is true these are trivial matters; but when an author undertakes to set the whole scientific world right, even on the most trivial point, he should first take care to be himself in the right.

and the blossoms of the clover. But it is not the general habit of Insects to prey at the same time upon two plants, which are so widely distinct as wheat and clover—the one monocotyledonous, the other dicotyledonous. Even the polyphagous Army-worm refuses to eat clover. *3rd.* The "curled" peach-leaves are said to be commonly inhabited by a *Thrips*, but not in sufficient numbers to account for the presence of the "Curl." (Harr. *Inj. Ins.* p. 240.) Now, as already stated, I have myself noticed several *Thrips* in June both in the larva and imago state on the Cecidomyidous gall *S. ænigma*, and have raised the larva to maturity in a breeding-jar in which there was nothing but that gall. Moreover, Dr. Fitch found his *Phlœothrips caryæ* in hickory galls. which are manifestly either closely allied to or identical with the Cecidomyidous hickory gall *Tubicola* O. S., though he doubts whether those galls were produced by the *Thrips* or by some other insect. (*N. Y. Rep.* II. p. 165.) And Osten Sacken observes of the galls of the Cecidomyidous *Lasioptera vitis* O. S., that "some of the hollows are often abandoned by their inmates and invaded by numerous *Thrips.*" (*Dipt. N. A.* p. 201.)

There are more insectivorous groups in Insecta than are commonly supposed. I have caught *Listotrophus cingulatus* Grv. (*Coleoptera*), which habitually haunts cow-dungs and carrion, with a large *Hister* in its mouth, and I believe, from sundry other facts, that in *Staphylinidæ*, which used to be all of them grouped as *Rhypophaga* or Dirt-eaters, the tribes *Staphylinini*, *Pæderini*, and probably *Stenini* and *Oxytelini*, are all generally insectivorous; while I know from having bred them, that some and probably all *Omalini* are fungivorous, and suspect that *Aleocharini* and *Tachyporini* are also "dirt-eaters." Again, I have often wondered that for seven successive years the number of the web-nests of *Hyphantria textor* Harris (*Lepidoptera*) remained, from year to year, an invariable quantity near Rock Island, neither increasing nor diminishing, though the number of eggs laid by each ♀ must be represented by the number of larvæ in a nest, which is very large. The larvæ can scarcely be preyed on to any very great extent by the ordinary Dipterous and Hymenopterous Parasites nor by birds, for they are effectually protected the greater part of the time by their impenetrable nests; and the Coleopterous genus *Calosoma*, which is known to prey on social caterpillars, is exceedingly rare near Rock Island. This autumn the mystery was partially solved. I found September 26 in a great many of their nests numerous *Rhaphigaster* n. sp. (?) (*Heteroptera*), both in the pupa and imago states, along with great quantities of their exuviæ; and suspecting them to be there on no friendly errand, I confined four of them in a breeding-jar, where I had a large brood of young Arctians raised from a mass of eggs and feeding on wild mulberry leaves. Within the next few days I had the pleasure of seeing one of them, on two separate occasions, with its beak porrect and plunged into the body of an unfortunate Arctian larva, and the sucked carcass of another one lying by its side. I had previously in August found 6 or 8 *Tetyra fimbriata* Say in the web-nest of another lepidopterous larva. Hence I infer that *Scutelleridæ* are generally insectivorous; for the *Rhaphigaster* had evidently, from the numbers of their exuviæ, been inhabiting the nests of *H. textor* for a long time. Some instances of their insectivorous habits are recorded by Westwood, though he states also that they live upon sap, "introducing their rostrum into leaves," which I have never seen them do. (*Intr.* II. p. 486.)

So much for the "Curl" on Peach-trees. There is another gall-like excrescence popularly known as the "Black-knot," and very abundant on the wild and cultivated Plum and occasionally found on the Cherry, which has been a similar *Crux Entomologorum*. Unlike the "Curl" this is just as common in the Valley of the Mississippi as it is said to be in the Eastern States, but I have never watched it through the earlier stages of its progress, and know it only in the mature and dry specimen. Dr. Fitch describes it as "commencing upon the small limbs, and to be recognized at first by a slight swelling of the bark on the upper side of the limb, which begins in autumn and remains stationary through the winter. In the spring this swelling increases, rupturing the cuticle and thin outer skin of the bark, and continuing to grow and puff out, till in June some inches in length of the limb at the place affected is three or four times its diameter elsewhere. Both the bark and woody fibres are changed into a *spongy substance*, not at all juicy like the fruit of a tree, of a pale yellow color when growing, but changing to coal-black when it is mature." (*Rep. Curculio and Black-Knot*, 1860, p. 21.) Although Dr. Fitch states that he "has examined these excrescences more closely, perhaps, than has ever been done by any other person," and that he is "prepared to say with the fullest confidence, that the microscope shows nothing about them, externally or internally, indicating that an insect has anything to do with causing them," and maintains that they "are not of insect origin, nor a vegetable fungus, but are properly a disease of the tree, analogous to the cancer in the human body," (*ibid.* pp. 21—2,) yet I cannot help believing that the "Black-knot," as well as the "Curl," is the work of Gall-gnats. It is perhaps presumptuous in one who has never specially investigated the subject, to set up his own opinion against that of a distinguished naturalist who has devoted considerable attention to it; but there is an old saying that "bystanders sometimes see more of the game than the players themselves," and it may be the case that a general acquaintance with many allied species can sometimes supply the place of the most laborious special investigations.

My reasons for the belief which I have just avowed are the following:—1*st.* Just as Curculionidous larva are inquilinous in the Cecidomyidous galls *Q. pilulæ* Walsh and *S. semen* n. sp. and others are inquilinous in the galls of other Gall-gnats, (see above p. 607, and below under *Coleoptera*), so the common Curculio (*Conotrachelus nenuphar* Hbst.) is notoriously inquilinous in the Black-knot. Dr. Fitch, for example, says, that the "larvæ of the Curculio are almost always found in them" (*Rep. Curc. and Bl. Knot*, p. 21), and Harris says that they are "sometimes" found there (*Inj. Ins.* p. 80.) Again, just as I have bred 8 distinct inquilinous Lepidoptera from various Cecidomyidous galls on the Willow, so Dr. Harris states that "the naked caterpillars of a minute moth are very common in the Warts of the Plum tree," (*Ibid.*) and I have myself found there their pupal exuviæ. 2*nd.* The general appearance of the Black-knot is very similar to that of the Cecidomyidous gall, *S. batatas* n. sp., and like that gall it is said to be "spongy" inside, when young and immature. On examining, Dec. 4th, 30—40 dead and dry specimens, I find that, besides some larger holes through which the Curculio and other inquilines have probably made their escape, they are perforated externally by several round holes, proportionally about ½ as numerous as in the above Willow-gall when it is a year old, and only .020—.025 inch in diameter, which is a trifle smaller than they are in that gall. Now this size is altogether too small for the larva of the Curculio—though it certainly suits well enough for that very rare parasite of the Curculio, *Sigalphus curculionis*, which has been described by Dr. Fitch; and it is likewise altogether too small for the Lepidopterous pupa, whose exuviæ I detected in this situation I incline to believe that these are the holes through which some Gall-gnat a trifle smaller than *C. s. batatas* has made its exit. At all events, there is no insect known to inhabit the Black-knot, except the very rare *S. curculionis*, to which they can possibly be referred. On cutting into these specimens, their internal structure is found to be the same as that of *S. batatas*, viz. fibres radiating from the axis of the twig, but the intervening matter is more woody than spongy. There have been so many inquilines boring them in all directions, as may be seen from the quantities of "frass" they have left behind them, that it is difficult to ascertain the structure of the cells. In a few specimens, however, which were mostly in their natural condition, I recognized cells, which appeared to me, on comparing the two together, to resemble very strongly those of *Cec. s. batatas*, and to be arranged almost exactly in the same manner; and in these cells there was no "frass" as there always is in the irregular holes inhabited by Curculionidous, Tenthredinidous or Lepidopterous larvæ. *3rd.* Dr. Fitch gives as a reason why the Black-knot cannot be a gall, that "always in galls one or more hard, seed-like bodies are found in the centre, in which the young of the fly producing them is inclosed." (*Rep. Curc. and Bl. Kt.* p. 22.) This is not true of any Cecidomyidous gall known to me, though it applies very well to Cynipidous galls. Hence this argument only proves that the Black-knot is not made by a Gall-fly, but is of no force whatever against the hypothesis of its being made by a Gall-gnat. *4th.* Specimens are said by Dr. Fitch to occur sometimes "wholly free from the Curculio larvæ and all other worms." (*Ibid.* p. 22.) Just so in the Cecidomyidous Willow-galls *S. verruca*, *S. semen* and *S. ænigma*, very many galls, be the cause what it may, are solid and tenantless; and out of nine specimens of the Cecidomyidous gall *S. nodulus*, I found two untenanted by any larva and unbored. (See above p. 600.) *5th.* I know by experience how difficult it is to rear *Cecidomyia* to the imago from galls severed from the parent tree, unless fresh specimens are gathered every few weeks to replace the old ones in the breeding-jar. (See above p. 574.) It does not appear that Dr. Fitch took this precaution, and hence, assuming the Black-knot to be the work of a Gall-gnat, I am not at all surprised at his failing to rear Gall-gnats from it. *6th.* I have not seen a line anywhere in Dr. Fitch's writings, from which it could be inferred, that he was aware of the peculiar character which distinguishes the larva of the Gall-gnats from all other larvæ, viz. the breast-bone. He has described in his Reports the larvæ of three different Gall-gnats, *Cec. grossulariæ* Fitch, *C. pseudacaciæ* Fitch and *C. robiniæ* Hald., yet in no one of these three cases does he breathe a syllable on this very important topic; and. as we have already seen, in the description of the larva of his *Cec. salicis* he mistakes the breast-bone for a part of the head. (See above p. 597.) Hence, even if he had found minute Cecidomyidous larvæ in the Black-knot, he might very possibly have mistaken them for the similarly apod larvæ of the Curculio, which he says that he found in "ALMOST ALL OF THEM." Just so the botanist Schweinitz, who asserts that the larvæ of a minute *Cynips* are found in the Black-knot, (quoted Harris *Inj. Ins.* p. 80,) seems to have mistaken Cecidomyidous larvæ for Cynipidous larvæ; and as we have already seen, (p. 551.) European authors formerly made the same confusion in the case of the insect of the "Rose-willow." *7th.* Gall-gnats, as shown above (p. 552). occur on an immense number of different and widely distinct genera of plants, and the other gall-making genera of insects on comparatively very few genera of plants. Consequently, if the Black-knot is a true gall, and not a mere disease, we may infer *a priori* that it is far more likely to be the work of a Gall-gnat than of any other of the gall insects. *8th.* Just as, with all the Willow-galls originated by Gall-gnats or Saw-flies upon twigs or limbs, and also with similar Oak-galls originated by Gall-flies, and with a hitherto undescribed, oval, Lepidopterous Gall on the twigs of the shrub called Amorpha fruticosa, which I have long noticed and which is produced by *Walshia amorphella* Clemens, and finally with the terminal gall of *Byrsocrypta vagabunda* Walsh, on the tips of the twigs of several poplars, (see *Proc. Ent. Soc. Phil.* II. p. 462,) the twig—unless it is pretty large or unless as in *S. nodulus* n. sp. the insect is very small and only one of them—is always killed by the presence of the gall; so with the Black-knot, as I have myself observed, the smaller limbs are killed by it and the larger ones —say of ½ or ¾ inch in diameter—are not so killed. On the other hand the pseudo-gall of the Coleopterous *Saperda inornata* Say, which grows on one of these same Willows, though the actual damage it does to the wood and bark, so far as we can estimate it by the eye, is proportionably ten times as great as with any gall produced by a Gall-gnat or Gall-fly or Saw-fly or Gall-moth or Plant-louse, yet never, so far as I have noticed, kills the limb on which it grows. The reason is obvious. In a true gall, made for example by a Gall-fly, besides the lesion of the woody fibre and bark, there is, as I have shown, (P. E. S. P. II. pp. 472—6,) poison infused into the wound, the result of which is generally death, unless the poisoned limb is very large and vigorous. In a pseudo-gall there is no such poison infused, and the damage done is simply what would be done, if we were to take an auger and bore the same quantity of wood and bark out of the limb. Whence we may draw this Corollary, that the Black-knot is probably a true Gall; and as from its structure it is manifestly not the work of a Gall-fly or of a Plant-louse, or of a Gall-moth—for the Galls of Gall-flies always contain hard, seed-like kernels and the Galls of Plant-lice and of Gall-moths, so far as my experience extends, are hollow—it follows that it must be the work of a Dipterous fly or else of a Saw-fly. But if it was the work of a Saw-fly, surely Dr. Fitch must have noticed its larva, so closely as he examined the gall; for the larvæ of Saw-flies are pretty large and may be recognized at a glance. Therefore it follows by the method of exhaustion that it must be the work of a Dipterous fly; and as there are but two Gall-making Dipterous families, *Trypetidæ* and *Cecidomyidæ*, and the former is poor and the latter exceedingly rich in species, it is most likely the work of some Cecidomyidous insect. 9*th*. As already stated (p. 578, note), I have found on the wild plum, galls strongly resembling the Cecidomyidous gall *S. brassicoides*, and which I have no doubt whatever are, like that gall, Cecidomyidous; and, unless my memory deceives me, I have noticed on the leaves of the wild plum in considerable quantities tubiliform galls strongly resembling the Cecidomyidous hickory-gall *Tubicola* O. S. Now I believe that it is a general law with gall-insects, that where one species of a particular genus exists on a given genus of plants, many other species of the same genus or of closely allied genera coexist with it. (See *Proc. Ent. Soc. Phil.* II. 461–2.) But, with the two exceptions just referred to, there is no Gall-fly or Saw-fly or Plant-louse or other gall-making insect known at present, so far as I am aware, to form galls on the Plum-tree. Hence if the Black-knot is the work of insects—which in spite of Dr. Fitch's positive asseveration I cannot help believing, and which Peck and Harris and others have believed before me,—it must in all probability, if we assume the truth of the above law, be the work of a Gall-gnat.

That the Black-knot is not, as has been supposed by many, the work of the Curculio, has been sufficiently demonstrated by Dr. Fitch from the fact, that specimens occur without any larvæ at all in them. It might be thought at first sight, that the same fact would bear equally hard against the hypothesis of its being the work of a Gall-gnat. But the singular phenomena with regard to several undoubtedly Cecidomyidous galls, which I have already referred to—no matter to what cause we choose to attribute them—take the case of the Gall-gnats out of the general rule. I will endeavor in this coming spring to examine the recent Black-knots and see whether, as I suspect, they are really inhabited by the larvæ of Gall-gnats, and if so to rear the perfect Gall-gnat from them.

If, then, as I have little doubt, the Black-knot be really a mere Cecidomyidous gall, we can at once solve a problem which has perplexed Economic Entomologists for the last half century, viz: how to get rid of it. All that is required in order to save our diseased Plum-trees from a premature death, is simply to cut off and burn the galls *before* the *Cecidomyia* makes its appearance in the imago state. Cutting off and burning the galls *after* the *Cecidomyia* has made its appearance in the imago state, will be just labor lost; for the eggs are then already laid, that will produce the next year's crop of Black-knot.

It will be noticed, that contrary to the hitherto generally accepted belief, I have not, in the reasonings just now adduced, enumerated Snout-beetles (*Curculionidæ*) as amongst the true Gall-making insects. I doubt very much whether any true Galls are produced by *Curculionidæ*. The holes that these last insects bore are bored, not by any ovipositor, but by their snouts; and to suppose that they can originate true galls, presupposes that they have the faculty of voiding from their snouts poisonous matter, similar to the poisonous matter that I have shown to be deposited along with the egg by the ovipositor of *Cynips*, (*Proc. Ent. Soc. Phil.* II. pp. 472—6), which is contrary to analogy. In all probability the various *Curculionidæ*, that are stated by authors to produce galls, are in reality nothing but inquilines in those galls, just as *Anthonomus scutellatus* Schönh. is inquilinous in the Tenthredinidous gall *S. pomum*, and in several other Tenthredinidous willow-galls, and as the snout-beetles enumerated in this Paper under *Coleoptera* are inquilinous in their respective galls.

INQUILINOUS CECIDOMYIDÆ OR GUEST GALL-GNATS.

Genus **CECIDOMYIA**—Subgenus **CECIDOMYIA**.

A. THE FOLLOWING occurs in prodigious abundance under the scales of the pine-cone like Gall, *S. strobiloides* O. S., but not imbedded in any cell, and is probably the species found in the larva state by Baron Osten Sacken in that situation, but not named or described by him, except as being "reddish." I have also bred a few imagos of it from the galls *S. brassicoides* and *S. rhodoides*, and as I found, May 12th, four of its pupal integuments in a vase containing the small variety of the Gall *S. batatas*—which integuments are readily distinguished from those of *C. s. batatas,* not only by their much smaller size, but also by the thoracic bristle and antennal horn being only ½ as long, and immaculate instead of black or tipped with black—I must also have bred them from that gall, though the imagos escaped me. As noticed below, the species is double-brooded, the spring brood coming out from last year's galls, and the autumnal brood from the galls of the same season, so as to be in time to oviposit in the same galls for the brood of the following spring. The two broods were obtained from two distinct lots of galls, each gathered only a few weeks before the insect appeared; so that it must not be supposed that they bred artificially in confinement. Those bred from the galls *S. brassicoides* and *S rhodoides* belonged exclusively to the autumnal brood. Other double-brooded *Cecidomyia* are stated to exist by Osten Sacken (*Dipt. N. A.* p. 186.) There can be no possible mistake about the identity of the larva, pupa and imago, because on May 3 I bred ♂ ♀ imago from cocoons which I had previously extracted from between the scales of the gall *S. strobiloides* and isolated in a vial, and the other Guest Gall-gnats obtained from this gall occurred exclusively in the autumn. The very general coexistence of these pupal cocoons with the eggs of an *Orchelimum* (see *Proc. Ent. Soc. Phil.* III. p. 232) under the scales of the gall *S. strobiloides*, both of them in very large numbers, was at first very puzzling; and I originally guessed that the Orthopterous eggs were the pupæ of some inquilinous Gall-gnat analogous to those of the Hessian Fly, and that what were the real cocoons of inquilinous Gall-gnats were the cocoons of minute Ichneumons that had been preying on the larvæ of the supposed Guest Gall-gnats!

The existence of this species, in the peculiar situation where it is found, solves an interesting question mooted by Winnertz, viz: whether inquilinous Gall-gnats "take the same food with their hosts or live on their excrements." (*Dipt. N. A.* p. 184.) In this case the host lives on the sap of the globular stem, from which all the leaves of the pine-cone like gall proceed, and the guest or inquiline must live on the sap, which he manages to extract from the scales or leaves of the pine-cone. Frequently there is a thickness of .30—.40 inch of solid leaves between the host and the guest, so that it is quite impossible here that the latter can live on the excrements of the former, or interfere with him in any way, except perhaps by slightly diminishing his supply of sap.

Larva.—Dec. 3rd the larva is orange-colored, a little mottled with sanguineous, and sometimes with a broad, dorsal, dark-sanguineous or fuscous vitta abbreviated before and behind. The two tubercles of the anal joint are a little larger and more prominent than usual. The breast-bone is clove-shaped, fuscous, not very distinct, and the stem of the clove is about ½ as wide as the entire breast-bone is long. Length .03—.04 inch, and breadth rather less than ½ that. Six specimens from cocoons under the scales of the gall *S. strobiloides.* Specimens taken out of the cocoon and examined Feb. 20, at which time none had yet gone to pupa, were orange-color, and on April 29 the breast-bone was darker and very distinct. The *cocoon* is oval, white, much stouter and denser than in any of the preceding species, so that the included larva can only be seen by holding it up to the light, and has a good deal of the white pubescence of the leaves of the gall adhering to it. Length of cocoon .07—.11 inch, breadth .03—.04 inch; 41 specimens which were all obtained from two galls Dec. 3, by which time, and probably long before that, all the larvæ had made their cocoons. Three of these cocoons each contained a yellowish larva, uninclosed in a separate cocoon, and apparently that of a Proctotrupide, one of which was found in the imago state April 29 with its head protruding from one of these cocoons, and another on the same day at large under the scales of the gall.

Pupa.—The first pupa was noticed April 21, but the larva was noticed as late as April 29, and from the first appearance of the imago, some of the insects must have existed in the pupa state at least as early as the first week in April. The abdomen was sanguineous; the rest of the body, including antennæ, legs and wing-cases, fuscous. The horns at the base of the antennæ were rectangularly conical, terminating in a very minute, acute thorn, and divergent in an angle of about 130°. The thoracic bristle was slender and ½ as long as the diameter of the thorax; (in the dried specimen it is terminally fuscous and basally pale;) and there was no perceptible bristle behind the antennæ. Another, examined May 3, which had worked its way entirely out of its cocoon in the vial where it was isolated, differed in no respect, except that the notum of the thorax was dull sanguineous with two brown vittæ and the scutel sanguineous, and the dorsum of the abdomen was tinged with brown. Length (2 dried specimens) .07 inch. The pupal integument (7 specimens) is white, with the antennæ and the anterior extremity of the body scarcely or not at all tinged with dusky.

Imago. Cecidomyia albovittata n. sp. ♂ ♀ (Recent.)—Generally pale umber-brown, sometimes umber-brown or brown-black, beneath paler. *Head* with its posterior surface uniformly without any white line next the eye. Antennæ ♂ fuscous, fully ¾ as long as the dried body, 14—15-jointed (2+12 to 2+13), tapering towards the tip, the joints of the flagellum spherical, with the pedicels often whitish or translucent and equal in length to the spherical part of the joint, the verticils to the full as long as the two complete joints from which they arise, and the last joint sometimes sessile, sometimes almost confluent with the penultimate, and sometimes represented by a slender, cylindrical prolongation of the penultimate. Antennæ ♀ fuscous, about ½ as long as the dried body exclusive of the oviduct, a little tapered towards the tip, the joints sessile, almost cylindrical at base, perfectly so at tip, so as to be very difficult to count, but probably nearly as numerous as in ♂, the verticils almost reduced to an irregular pilosity scarcely ½ as long as ♂ verticils. *Thorax* with a row of whitish hairs in each longitudinal stria, giving the appearance of two whitish vittæ, and with irregular, lateral, whitish hairs, the 3 interstices glabrous. Origin of the wings and a large spot beneath them orange-color or sanguineous, in the dried specimen dull rufous. Halteres pale, the club more or less infuscated. *Abdomen* ♂ generally clay- or honey-yellow, sometimes yellowish-fulvous, very rarely rufo-sanguineous, the dorsum with short, umber-brown hairs, which occasionally, when the abdomen is much plumped out, become so sparse as to not at all hide the color of the integument, but are almost always located in such a manner and so densely, as to entirely conceal the color of the whole of each joint, or sometimes to conceal only the medial ½ of each joint, and sometimes to conceal all but the sutures. In three specimens where the abdomen, although recent, is much less plump than is usual, and has collapsed so as to leave a deep, dorsal longitudinal stria, the brown hairs are collected in that stria so as to assume the appearance of a narrow, linear, dorsal vitta. Venter with more or less dense, whitish hairs. *Abdomen* ♀ generally bright sanguineous, sometimes sanguineous, rarely rufo-sanguineous, the dorsum with umber-brown hairs varying in their arrangement and denseness precisely as in ♂, except that in two ♀ ♀ the six basal joints, and in two others the three basal joints of the abdomen had their posterior ½ covered by the brown hairs and the anterior ½ glabrous and sanguineous. A ♀, ten minutes after emerging from the pupa, had the dorsum of each joint, except the sutures, concealed by the brown hairs. A single mature ♀ had the anterior ⅔ of the abdomen creamy yellow, with the brown hairs of the dorsum collected in an acute, longitudinal, dorsal stria, so as to simulate a linear, dorsal, brown vitta, as in the 3 ♂ ♂ above referred to, while the posterior ⅓, including the oviduct, was sanguineous and normal with-

out any stria or vitta. Another ♀ showed the same stria rather less deep and acute, but without the normal sanguineous color being changed. Venter with short, white or silvery white, more or less dense, appressed hairs. Oviduct ⅓—1⅓ as long as the rest of the abdomen, almost always yellowish, but in 2 ♀ ♀, besides the one already referred to, it was sanguineous, joints 1—7 of the abdomen being covered by brown hair except the sutures which were sanguineous, and only the 8th or last being glabrous and entirely sanguineous. *Legs* (dried) pale, with their tarsal tips and the whole of their superior surface, except more or less of the basal part of the femur, usually coal-black, but varying all the way to the entire leg being pale and almost immaculate. *Wings* tinged with dusky, from fine, appressed, dusky pubescence. The costal vein very stout and black, except in a few specimens where it is less so. The 1st longitudinal vein generally indistinct and more or less confluent with the costal, occasionally pretty distinct and plain. The cross-vein between the 1st and 2nd longitudinal vein obsolete. The 2nd longitudinal vein perfectly straight at tip, and reaching the margin of the wing much before the tip, at a point ⅓ of the way from the point where it attains it in *Cecidomyia* (*Dipt. N. A.* fig. 1. p. 174) to the point where it attains it in *Spaniocera* (*ibid* fig. 6. p. 175), whereas in all the preceding species it reaches it as in *Cecidomyia* (*ibid* fig. 1. p. 174.) Anterior branch of the 3rd longitudinal vein very distinct at its origin, and curved nearly as in *C. s. batatas*, but still more apparently a prolongation of the main vein, and with the tip, as in that species, scarcely recurved. Length ♂ ♀ (dried) .04—.07 inch. Length wing ♂ ♀ .06—.09 inch.

Described entirely from 19 ♂, 24 ♀ of the first or spring brood; but 9 ♂ and 6 ♀ of the second or autumnal brood offered no remarkable variation. The first brood came out April 10—May 14, and in prodigious numbers for several subsequent weeks; the second brood came out July 31—September 11. This species, like *C. s. batatas*, preserves its colors very tolerably in the dried specimen, even as regards the abdomen. From the description of the ♀ abdomen given above, it is manifest that its sanguineous color is due to the included eggs, even the oviduct, which is almost always yellowish, being occasionally sanguineous. The two white vittæ on the thorax, from which the species takes its name, occur also in the Gall-gnat *C. s. batatas* and in the Guest Gall-gnat *C. orbitalis*. Very much like a minute specimen of *C. s. batatas*, but may be distinguished by its smaller size, by the ♂ antennæ having at least 3 joints fewer, by their pedicels being twice as long, and by the 2nd longitudinal vein reaching the margin of the wing further from the tip. The best distinctive character, however, is found in the pupa, which, as it ordinarily has no dense, spongy substance to work its way out through, has short antennal horns, not thickened at tip as we know that they must be in *C. s. batatas* (pupa), from their tips in the pupal integument of that species being quite black, instead of whitish hyaline as they are in *C. albovittata* (pupa).

B. OF THE FOLLOWING species 1 ♂ 3 ♀ were bred from the Cecidomyidous Gall *S. batatas* and 2 ♂ from the Tenthredinidous Gall *S. ovulum*. As there is one variety of *S. batatas* that is undistinguishable externally from *S. ovulum*, which grows on the same willow, it is proper to add here that 1 ♂ 1 ♀ were bred from a variety of *S. batatas*, very distinct from *S. ovulum*, which had been placed in a separate vase from the other varieties, and that of the two ♂ ♂ bred from *S. ovulum*, I recognized the gall from which one ♂ had made its exit by its being the only bored gall in the vase, and on cutting into it found it to be a true *S. ovulum* and not a *S. batatas*. I have also a ♀ bred from *S. strobiloides* which can only be referred to this species, though I did not take a description of it while recent, and a ♂ bred from *S. brassicoides* in 1862, of which the same may be said. Thus we find the same species inquilinous in certainly 2, and most probably 4 distinct galls, 3 of them made by Gall-gnats and 1 by a Saw-fly.

Larva unknown.

Pupa (from the pupal integument.)—The antennal horns are obsolete, and the thoracic bristle is about ¼ as long as the thorax is wide. The color of the integument is white, the anterior parts scarcely or not at all tinged with dusky.—Two specimens.

Imago. C. orbitalis n. sp. ♂ ♀ (Recent.)—Dull umber-brown, paler beneath. *Head* with conspicuous white hair above the mouth, and with its posterior surface blackish except a conspicuous, linear, white orbit behind each eye, not interrupted between the eyes, which is apparently produced by very minute white hairs. (In the dried specimen this becomes indistinct, but rarely obsolete.) Antennæ ♂ ⅔—¾ as long as the dried body, 18—19-jointed (2+16 to 2+17), scarcely tapered towards the tip, the flagellar joints globular, the pedicels ½ as long as the joints and whitish or hyaline, the verticils full as long as the two complete joints from which they arise, the last joint in the ♂ with 18-jointed antennæ sessile and apparently almost connate with the penultimate, in the other ♂ pedicelled as usual. Antennæ ♀ nearly half as long as the dried body exclusive of the oviduct, slightly tapered, the joints sessile, almost cylindrical, especially towards the tip, and difficult to count, the verticils reduced to an irregular pilosity half as long as the ♂ verticils. *Thorax* with a row of white hairs in each longitudinal suture, simulating a double white vitta. Origin of wings and a large spot beneath them fulvous or sanguineous. Scutel blackish, a little polished. Halteres whitish, the knob sometimes dusky, and in the specimen from *S. brassicoides* (dried) deep black. *Abdomen* ♂ dull luteous or dull rufous, dorsally covered with brown hairs, laterally and ventrally with short white hairs, the ventral hairs appressed; sometimes the brown hairs cover the entire dorsal surface, sometimes there are only 2 or 3 of the basal joints dorsally covered with brown hairs on their medial ½, sometimes the basal joint is entirely covered with brown hairs and the 2 or 3 next only medially covered, each succeeding joint for a shorter space, so as to show a wider luteous or rufous band on each succeeding joint. *Abdomen* ♀ with the dorsum sanguineous, rarely dark umber brown; sometimes with the entire dorsal surface covered by short, brown hairs, except the hind edge of each joint, which is covered with cinereous hairs, and the sutures, which are glabrous and dark umber brown; sometimes covered dorsally with brown hairs, except the sutures, which are glabrous, so as to exhibit each a narrow sanguineous band; sometimes with joints 1—7 only slightly covered between the sutural sanguineous bands by brown hairs, and the 8th or last joint, i. e. the last joint of the oviduct, glabrous and fulvous. Venter always sanguineous with short, appressed, whitish pubescence, longer, whiter and denser towards the dorsum. Oviduct ⅓—⅔ as long as the other part of the abdomen, with the last joint very long and always fulvous or yellowish. *Legs* (dried) pale, superiorly black or pale fuscous, except the basal ½ of the femora and sometimes of the tibiæ, and with the terminal ½ or ¾ of the tarsi entirely black; rarely almost immaculate except the tarsi. *Wings* tinged with dusky, from minute, appressed dusky pubecsence; the cross-vein between the 1st and 2nd longitudinal veins obsolete; the 2nd longitudinal vein attaining the margin only a little before the tip of the wing (as in *Dipt. N. A.* fig. 1. p. 174), and not recurved at tip. The anterior branch of the 3rd longitudinal vein very distinct at its origin and arising from the main vein nearly as in *C. s. batatas*, with its tip slightly recurved, so that the whole branch nearly follows the curve described by one edge of a lanceolate leaf 5 times as long as wide. Length ♂ .09—.10 inch, ♀ (including oviduct) .10—.15 inch. Length wing ♂ ♀ .13—.14 inch.

Described from 3 ♂ 3 ♀ all recent, besides 1 ♂ and 1 ♀ both dried as before stated. Much smaller than *C. s. brassicoides* and its allies, and distinguishable from them all by the anterior branch of the 3rd longitudinal vein being remarkably distinct at its origin and much straighter and less recurved at tip, and from *C. s. batatas* and all other *Cecidomyia* known to me, when recent, by the remarkable white orbits of its eyes. In all the dried specimens but one, these white orbits are tolerably distinct but not obvious, and they are so also in the specimens from *S. brassicoides* and *S. strobiloides*. The antennal horns of the pupal integument being obsolete, and not distinct, long, and tipped with black, also separates this species effectually from *C. s. batatas*.

C. THE FOLLOWING bores cylindrical holes, like a *Tomicus*, in the solid wood of the largest of the willow-stems from which grow the bunches of the gall *S. brassicoides*, generally pretty close to the points from which the separate galls of the bunch spring, and generally where a good-sized willow-stem has been arrested in its growth by the galls and forms an elongate-oval swelling, from which arise the galls, and intermixed with them a few slender, half-starved twigs. The interior surface of these holes or burrows is always much blackened and discolored, and they open outwards through the bark, which gave me the first hint of the presence of an insect in so unlikely a locality. But even in so retired a situation as this, ensconced as he is in his burrow and surrounded on all sides by the dense, cabbage-like galls of his Hosts, the avenging Nemesis pursues the unfortunate Guest; for he is preyed upon to a very great extent by a parasitic Chalcidide belonging to *Eurytomides*, which I bred to the imago state from pupæ found in the burrows of the Guest Gall-gnat himself. Thus, even in Insect Life, sooner or later punishment overtakes those, who live, not on the fruits of their own exertions, but by the unrequited toil of their neighbors.

Larva unknown.

Pupa.—Several specimens examined July 15 had the abdomen yellowish or reddish, and the rest of the body, including the antennæ, legs and wing-cases, blackish. The antennal horns were very long, being 1-6th—1-7th as long as the body and projecting almost horizontally forwards so as to touch one another throughout, the basal ½ of each forming a cone with its sides in an angle of about 40°, the terminal ½ suddenly contracted into a slender, cylindrical thorn, scarcely tapered and scarcely acute at tip. Length (living) .09—.12 inch. The pupal integument (1 specimen) has the thorn at the tip of the antennal horn black, showing that that part in the living pupa is thickened for the purpose of enabling it to work its way out through the wood in which it resides. The conical part of the antennal horn, and in a less degree the anterior end of the body, are slightly obfuscated, the rest of the integument, including the antennæ, legs and wing-cases, being as usual whitish-subhyaline.

The antennal horns are much longer in this pupa than in any other known to me, whence the specific name.

Imago. C. cornuta n. sp. ♂ (dried.)—Dull rufous when immature, brown-black when mature, paler beneath. *Head* with the antennæ pale brown, 3-5ths as long as the body, 16—17-jointed (2+14 to 2+15), the same individual in one instance having 16 joints to one antenna and 17 to the other, the flagellar joints globular, the pedicels ½ as long as the joints, the verticils as long as 2½ of the complete joints from which they spring, the last joint whether in the 16- or 17-jointed antenna sessile and closely united with the penultimate. *Thorax* with erect blackish hairs. Scutel and metathorax always dull rufous. Origin of wings and a large spot beneath them dull rufous. Halteres pale, the club blackish even in the immature specimen. *Abdomen* blackish, with rather long, erect blackish hairs on its dorsum. Venter with dark gray pubescence, and in the immature specimen tinged with rufous. *Legs* pale, very slightly tinged with fuscous above and on the tarsal tips. *Wings* with rather fine, sparse, gray pubescence, but with the normal fringe behind; fringe as long as usual. Costal vein full as slender as the 2nd longitudinal; 1st longitudinal very distinct; cross-vein between 1st and 2nd longitudinal entirely absent; 2nd longitudinal not sinuate or incurved near its base and reaching the margin a trifle nearer the tip of the wing than in Fig. 1. *Dipt. N. A.* p. 174, scarcely recurved at tip, and elsewhere almost perfectly straight, or if anything curved forwards rather than recurved. Anterior branch of the 3rd longitudinal vein slender and in one wing obsolete on its basal ½, in the other wing of the same ♂ it unites normally with the main vein, and nearly describes the curve formed by one edge of a lanceolate leaf 6 times as long as wide. Length ♂ .08 inch; wing ♂ .09 inch.

Described from two ♂, which came out July 15 and shortly afterwards, one of them immature and with the wings badly shrivelled, the other mature; ♀ unknown. Very rare near Rock Island, Illinois. There can be no doubt of the identity of the pupa and imago, as both ♂ ♂ were bred from pupæ dug out of the cylindrical burrows in which they reside.

Genus CECIDOMYIA.—Subgenus DIPLOSIS.

Like the subgenus *Cecidomyia*, this subgenus seems to consist partly of gall-makers and partly of inquilines. To the true gall-makers belong apparently *D. caryæ* O. S., *D. robiniæ* Hald. and possibly *Cec.* (diplosis?) *pseudacaciæ* Fitch. I describe below four species which are, beyond all doubt, inquilinous in their habits, and it will shortly be shown that the European *D. tibialis* Wz. must be so likewise.

D. **Diplosis atroocularis** n. sp. ♂ ♀ (Recent.)—Whitish, tinged more or less with gamboge-yellow; beneath almost white. *Head* with the eyes coal-black and very conspicuous both in the recent and the dried specimen, whence the specific name. *Antennæ* ♂ very slender, half as long again as the dried body, 23—24-jointed (2+21 to 2+22), the joints globular and slightly obfuscated, in the mature specimen towards the tip of the antenna scarcely or but very slightly large and small alternately, in the less mature specimens more obviously so, difficult to count from 2 or 3 of the terminal ones being sometimes more or less sessile and simulating an elongated club; the pedicels hyaline and as long as the globular part of the joint; the verticils scarcely as long as two of the complete joints from which they spring, usually, except in immature ♂ ♂, directed forwards at an angle of 45° with the axis of the antenna, instead of being nearly at right angles with it. Antennæ ♀ slightly tinged with dusky, much more robust than in ♂, ¾—⅞ as long as the dried body, 14-jointed (2+12), the last joint slenderly cylindrical, acute at tip, sessile, evidently connate with the penultimate, and in the dried specimens sometimes obsolete, so that the antenna is properly 13-jointed, not 14-jointed; the other joints of the flagellum cylindrical-oval, ½ longer than wide, and all of them as well as the terminal one slightly obfuscated; pedicels hyaline and about ¾ as long as the joints; verticils springing densely and evenly from every part of the oval joint, directed as usual, and about ¾ as long as the complete joint from which they spring. *Abdomen* ♀ with the oviduct scarcely ever exserted, and when exserted only ⅓ as long as the rest of the abdomen. *Legs* with more or less of the tarsal tips, and sometimes the superior surface of the tibiæ, slightly dusky. *Wings* heavily fringed behind, lightly on the costa, covered with minute, appressed hairs, and slightly tinged as well as their veins with gamboge-yellow throughout, or sometimes towards the tip in certain lights with dusky; costal vein moderately robust; 1st longitudinal often not confluent with the costal till it reaches half way to the tip of the wing; cross-vein distinct, placed 1-5th of the way to the tip of the wing. Anterior branch of the 3rd longitudinal springing from that vein at an angle of 135° for a minute space, then curving suddenly and proceeding straight towards the margin of the wing until close to the tip when it is slightly recurved, the whole branch thus describing one half of the outline of the link of a log-chain 6 or 7 times as long as wide and longitudinally bisected. In other respects the neuration agrees precisely with fig. 2, *Dipt. N. A.* p. 174.—Length (dried) ♂ .06—.07 inch, ♀ .05—.07 inch. Wing ♂ .07—.09 inch, ♀ .07—.10 inch.

Described from 4 ♂ 10 ♀, bred from the gall *S. strobiloides* of the same summer's growth, August 31—September 13. I know nothing positively of its Natural History, the larva and pupa being both of them undiscovered by me; but as there was nothing in the vase, where I bred them, but the galls and a few inches of the twig attached to each gall without any leaves remaining on it, the larva must have lived either in one or the other, most probably under the scales of the gall like *Cec. albovittata* n. sp., of which numerous specimens came out in company with it. Thinking it just possible that the pale color in this insect might be partly due to immaturity, I confined one of them in a glass vessel for 24 hours, exposed to the light, and it did not become one particle darker. A European *Diplosis*, *D. tibialis* Wz., was "reared from the same gall as *Cec. salicina* Schr.," according to Osten Sacken, (*Dipt. N. A.* p. 179.) Hence we may conclude that, as my *Diplosis* was an inquiline in a Willow-gall made by a true *Cecidomyia*, the European *Diplosis* was so likewise, both galls, as I infer from the name *salicina*, growing on the willow. *D. atrocularis* ♀ comes very near to *Cec. grossulariæ* Fitch, but in that species the pedicels of the antennæ are only "⅓ as long as the joints," instead of ¾, the oval joints of the antennæ are "more than twice as long as broad" instead of 1½ times as long, and the wings are "faintly tinged with dusky" instead of with yellow. The number of antennal joints, too, in *grossulariæ* is said to be only 12, instead of 13 or 14; but that may very probably have arisen from the scapus being counted as only one joint instead of two. (See above, p. 557.) Loew, for what reason he does not state, perhaps because the verticils are not mentioned in the description, thinks that Fitch's species "ought, as it seems, to be referred to the subgenus *Asphondylia*," which has no verticils at all ♂ ♀. (*Dipt. N. A.* pp. 7 and 176.) But Fitch refers his species to *Cecidomyia*, which he would scarcely have done if it had been totally without verticils, unless he had at the same time stated the fact of there being no verticils. I suspect it is a *Diplosis*, and that the ♀ only was known to the describer, who says not a word about the sexes in his description.

The subgenus *Diplosis* is circumscribed as having "26-jointed ♂ antennæ with sometimes one additional rudimental joint;" (*Dipt. N. A.* p. 176;) but from carefully examining the dried specimens, I am pretty well satisfied that in *atrocularis*, as well as in *septem-maculata* n. sp., the antennæ ♂ are only 23—25-jointed. Since in the subgenus *Cecidomyia* the number of antennal joints ♂ is confessedly very inconstant, not only differing in different species, but varying even in the same species, and actually in the right and left antenna of the same individual, it seems but agreeable to what I have called the Law of Equable Variability, that it should be somewhat similarly inconstant in the ♂ of the allied subgenus *Diplosis*. The same observations apply in a less degree to the ♀ antenna, which, as stated in the description, is in *atrocularis* properly speaking 13-jointed, though it is limited subgenerically as being "14-jointed with sometimes one additional rudimental joint." The number of joints being so very much smaller in ♀ than in ♂ *Diplosis*, we cannot expect to find the range of variation so extensive in the ♀ as in the ♂. (See above pp. 556–7.) "The number of the joints of the antennæ," says Loew, "is of higher value among the Gall-gnats, for the distinction of species, than for that of genera, since *almost every genus comprises species with different numbers of joints of the antennæ.*" (*Dipt. N. A.* p. 179.) We see the same thing in *Cynipidæ*. (*P. E. S. P.* II. pp. 460–1.)

E. D. ATRICORNIS n. sp. (Dried.) ♂ Differs from ♂ of *atrocularis* only as follows:—1*st*. The antennæ are twice as long, instead of half as long again as the dried body, conspicuously stouter, about 24-jointed.

the last joint sessile and closely united with the penultimate, the globular part of the flagellar joints, and also the verticils, coal-black instead of being merely tinged with dusky, and towards the tip of the antennæ the former are alternately small and large, but in a somewhat irregular manner, the larger ones full ½ longer and wider, the smaller ones scarcely shorter and narrower than in *atrocularis*. That it may not be supposed that the difference in color of the globular joints is caused by the degree of maturity, the most mature insect as usual being the darkest colored, it is proper to say here, that one of my ♂ *atrocularis*, which species has the paler antennæ, is decidedly more mature than my *atricornis* which has much the darker antennæ. *2nd.* The legs have the femora superiorly black, otherwise as in *atrocularis*. *3rd.* As in the following species, there is no cross-vein whatever between the 1st and 2nd longitudinal veins, even when the wing is held up to the light under the strongest lens.—Length ♂ .05 inch. Wing ♂ .07 inch. One ♂, reared from *S. strobiloides* galls in the first week of September, along with the preceding and following; ♀ unknown. It might be supposed to be the ♂ of the following, but for the total absence of the 3 spots on the wings, and other differences pointed out under that species.

F. D. ANNULIPES n. sp. (Dried.) ♀ Differs from the ♀ of *atrocularis* only as follows:—*1st.* The antennæ ♀ are nearly as long as the dried body, 12-jointed (2+10) both in the recent and in the dried specimen, instead of 13-jointed, the flagellar joints globular towards the tip, only slightly oval towards the base, the last joint nearly twice as long as broad and tapered to an acute point; the verticils 1—1¼ times as long as the complete joint from which they spring, instead of being only ¾ as long. *2nd.* The legs do not have the femora black above as in *atricornis*, though as in some *atrocularis* the tibiæ are occasionally a little obfuscated above; but they differ remarkably from both species in the terminal ½ or ⅓ of the 2nd or elongated tarsal joint, and the whole of the 4th and 5th tarsal joints being black, the intervening 3rd joint being whitish and thus displaying a conspicuous white annulus, whence the specific name. *3rd.* There are 3 obscurely bounded, pale-dusky spots on the wing, caused by a greater density of the pubescence which is dusky, viz. one subquadrate spot placed ⅔ of the way to the tip of the wing and extending from the 2nd longitudinal to the costal, which is accompanied by a thickening of that portion of the costal which bounds it; another spot smaller, more indistinct, and sometimes subobsolete, on the tip of the anterior branch of the 3rd longitudinal; and a third spot of a triangular shape, about the same size as the first but the most conspicuous of the three, which occupies the angle where the costal meets the tip of the 2nd longitudinal, and is accompanied by a decided thickening and blackening of that portion of the two veins which bounds it. 4*th*. As in *atricornis* there is no cross-vein between the 1st and 2nd longitudinal.—Length ♀ .05—.06 inch. Wing ♀ .07 inch. Three ♀, bred from the gall *S. strobiloides* in the first week of September, along with the two preceding species and great numbers of *C. albovittata* n. sp.; ♂ unknown.

G. **D. septem-maculata** n. sp. ♂ ♀. (Recent.) Dull rufous when immature, blackish when mature, beneath paler. *Head* with the antennæ ♂ ½ longer than the dried body, 23—24 jointed (2+21 to 2+22), the flagellar joints globular and coal-black, the last joint oval and ½ longer than wide, the pedicels whitish-hyaline and about as long as the globular part of the joint, the verticils black, very dense, rather oblique and fully as long as two of the complete joints from which they spring. Antennæ ♀ about ¾ as long as the dried body, 13-jointed (2+11), in one recent specimen 12-jointed (2+10), the flagellar joints dusky, twice as wide as in ♂, short-oval, ¼—⅓ longer than wide, the pedicels whitish-hyaline and ¾ as long as the oval part of the joint, the verticils fully equal in length to the one complete joint from which they spring. *Thorax* with a row of brownish-yellow hairs in each longitudinal suture of the notum, some irregular lateral ones and the scutel covered with others. Halteres pale. *Abdomen* ♂ (dried) yellowish-brown. Abdomen ♀ sanguineous (both recent and dried), in two dried ♀ yellowish brown. Oviduct almost always retracted, when exserted only as long as one abdominal joint. *Legs* (dried) pale dull luteous, their tarsal tips and often their whole superior surface, except the base of the femora, tinged more or less with dusky, and the entire length of the hind leg ♂ ♀ bipectinated with very fine, sparse, ciliations as long as the hind fringe of the wings. *Wings* deeply tinged with dusky, from minute, appressed, dusky hairs, fringed all round, the costal fringe about ½ as dense and nearly as long as the other part, with 7 obscurely-bounded, whitish-hyaline spots, which are caused by the greater sparseness of the dusky hairs and are situated as follows:—A transverse row of 3 subquadrangular spots placed about ⅓ of the way to the tip of the wing, forming a fascia across the entire wing, cut in three only by the 2nd and 3rd longitudinal veins, which are dusky here as elsewhere; another subquadrate one about 3-5ths of the way to the tip of the wing, extending all the way from the 2nd longitudinal to the costa; another occupying almost the entire space between the forks of the 3rd longitudinal; another which is occasionally subobsolete, in the angle formed by the union of the 2nd longitudinal with the costal; and a subterminal one, very variable and irregular in its shape and

size, but always narrowly connected with the margin a little before the tip of the anterior branch of the 3rd longitudinal. Neuration normal, save that the cross-vein between the 1st and 2nd longitudinals is entirely absent. Anterior branch of the 3rd longitudinal slender, but distinct throughout, and nearly describing a circular arc of 45°, with the convexity towards the costa. Length (dried) ♂ .05 inch; ♀ .05—.06 inch. Wing ♂ .06 inch; ♀ .06—.07 inch.

One ♂, five ♀, bred from the gall *S. brassicoides* Aug. 24—28. Of their Natural History I know nothing. This species may not improbably be identical with Say's *Cec. ornata*, so far as we can judge from his very brief and imperfect description, though it seems that Osten Sacken and Wiedeman still refer that species to *Cecidomyia*, perhaps from not having identified it with any specimens in their possession. Say's species occurred Sept. 13th in Philadelphia, so that the time of capture agrees very well. In any case his description is utterly insufficient to identify any insect in this very difficult family, and ought therefore to be disregarded. The hairiness of the hind legs in 7-*maculata* is remarkable and unusual; but, judging from the name, *Cec. hirtipes* O. S. must also have some of its legs hairy, though nothing is said on the subject in the description. In the following species all 6 femora are hairy.

_H._ D. decem-maculata n. sp. (Recent.) ♂ ♀. Pale luteous with sparse whitish-gray hairs. _Head_ with the eyes coal-black. Antennæ (dried) ♂ full 1½ times as long as the dried body, 22—25-jointed (2+20 to 2+23), 22-jointed in one recent ♂, the last joint in one of the 25-jointed antennæ tapered suddenly to an acute point; the scapus more elongate than usual; the flagellar joints fuscous, globular, sometimes towards the tip alternately small and large in an irregular manner and with here and there a sessile i. e. double joint; the pedicels whitish-hyaline and about as long as the joints; the verticils dusky, a little oblique and scarcely as long as the two complete joints from which they spring. Antennæ (dried) ♀ nearly as long as the dried body, 12—13-jointed (2+10 to 2+11), in a recent ♀ counted as 13-jointed; the scapus more elongate than usual; the flagellar joints fuscous, oval, and ½ longer than wide; the pedicels whitish-hyaline and about ¾ as long as the joints; the verticils fuscous and fully as long as the complete joint from which they spring. _Thorax_ (recent) with a spot above the origin of each wing, and the tip of the scutel, pale fuscous; in one dried ♀ these spots do not appear. Halteres pale, generally with the club a little obfuscated. _Abdomen_ (recent) with a terminal dorsal spot on joints 1—5, and a large, lateral, medial spot, which is scarcely interrupted at the sutures, on joints 1—6, all pale fuscous; in one dried ♀ the lateral spots are obsolete, in the others ♂ ♀ they are all as well as the dorsal spots distinct. Oviduct not exserted. _Legs_ (recent and dried) whitish, with a pale-fuscous spot on the exterior surface of the coxæ; femora, except towards their bases, fuscous above and laterally, the fuscous color almost meeting below; tibiæ pale fuscous at

tip and almost always at base, rarely with their whole superior surface pale fuscous: the whole of tarsal joints 1 and 5, and the base of 2, and the tips of 2—4, all pale fuscous. Each femur ♂ ♀ is ciliated beneath with gray ciliations, as long as but much more sparse than the hind fringe of the wings. *Wings* as well as their veins, except the posterior branch of the 3rd longitudinal which is whitish, pale fuscous from minute, appressed hairs, except on the following spots, where they are whitish-hyaline from the hairs becoming sparse, the pale spots dominating the dark ground-color.—Between the 1st and 2nd longitudinals, halfway to the tip of the wing, a large spot, twice as long as wide and extending from one vein to the other, and 2 subsemicircular spots with their diameter resting on the costal and their circumference generally not quite reaching the 2nd longitudinal, the first spot ⅔ of the way to the tip of wing and the last close to the tip. Between the 2nd and 3rd longitudinals a triangular basal spot extending to both veins and reaching to the point where the wing suddenly becomes wider; a large rhomboidal spot conterminous with the 1st or large costal spot and only divided from it by the 2nd longitudinal which here as elsewhere is pale fuscous; a small, round, isolated spot ¾ of the way to the tip of the wing; and a large subtriangular spot commencing just beyond the small spot, and extending to each vein laterally and to the terminal margin, except that it abuts on the middle of its terminal boundary on a pale-fuscous, terminal spot. Behind the 3rd longitudinal 2 subquadrangular spots—the first elongate and subbasal, the second abbreviated and straddling the posterior branch of the 3rd longitudinal, and both of them extending from vein to margin with but a narrow fuscous space on the basal and terminal side of each—and a triangular spot occupying the terminal ⅓ of the space between the forks of the 3rd longitudinal; making in all 10 spots, arranged in 3 rows. 3 and 4 and 3 in a row. Ciliations extending all round the wing, as long but only about ½ as dense on the costa as behind. No cross-vein between the 1st and 2nd longitudinals. Anterior branch of the 3rd longitudinal very distinct, and so nearly straight that it describes a circular arc of about 25°. Neuration otherwise normal.—Length (dried) ♂ .05—.06 inch, ♀ .06—.07 inch. Length wing ♂ .07 inch, ♀ .07—.10 inch.

Two ♂, three ♀, bred from the gall *S. strobiloides* Aug. 28—Sept. 1. The ornamentation of the legs agrees almost exactly with that of *D. maccus* Lw., though from some cause or other, perhaps because the legs were all mutilated, Loew omits all mention of the coloration of the 5th tarsal joint of that species; but the structure and coloration of the antennæ and the spottings of the wings are quite different in the two. This is a most elegant species, and the spots of the wings are well defined and bright, not obscure and indefinite as in 7-*maculata*.

BIBIONIDÆ.

I. SCATOPSE RECURVA? Lw. I bred a single specimen some years since from the Tenthredinidous gall, *S. pomum* n. sp.

DROSOPHILIDÆ.

J. Drosophila amœna Lw. I bred eight specimens of this elegant little insect Aug. 17—27, from the gall *S. strobiloides.* Baron Osten Sacken, to whom I am under obligations for determining both this and the preceding species, observes as follows in regard to its habits:—"The genus *Drosophila* occurs in the vicinity of acid or fermenting matters, as vinegar, decaying apples, &c., in which the larvæ live. *D. amœna* occurs commonly among decaying leaves, and the occurrence of its larva in the gall *Strobiloides* is probably not the general rule. I have found the fly abundantly in places where hardly any Willows were to be met with."—As I have 6 specimens, all captured at large at the same time near Rock Island, it must be tolerably common there also.

TACHINIDÆ.

A gray species .09 inch long was bred Sept. 1 from the Tenthredinidous gall *S. pomum.* It might have been parasitic either upon the author of the gall, or upon a beautiful harlequin-like, 12-banded, Lepidopterous larva, which is commonly inquilinous there, but which I have not yet succeeded in raising to the imago.

A robust, blackish species, .14 inch long, was bred Aug. 18 from the Cecidomyidous gall *S. brassicoides.* It seems almost too large to have infested any of the 5 species of Lepidoptera that I have found to be inquilinous in that gall; but as I bred therefrom a single specimen of the common *Loxotænia rosaceana* Harr., which must have accidentally got in among the expanded leaves of the galls, it might possibly have been parasitical upon some such larva. I have neither the facilities, nor the time, nor the requisite experience, to determine the above 2 species either generically or specifically, and therefore dismiss them with this brief notice.

And now, after toiling through all these long and frequently tedious details—after we have seen that the Gall-gnats of the Willow, though they are essentially distinct species, yet resemble one another so closely, that in almost all cases it is difficult, and in some cases impossible to distinguish the imagos one from the other—after we have seen that species inhabiting monothalamous bud-galls of the same fundamental structure, such as the first six described above, are in the imago state either exactly or almost exactly alike, and that a species, *S. batatas*, which inhabits a polythalamous twig-gall of a totally different structure, is comparatively speaking widely distinct from the first—after we have traced the same law even in the larvæ, and found that those which inhabit the bud-galls are yellowish with whitish markings and all exactly alike, and that which inhabits the twig-gall is sanguineous marked with yellowish and has a totally different breast-bone—after we have seen the Guest Gall-gnats, not themselves making any galls, but dwelling in galls constructed by the true Gall-makers, generally in those of such species as are allied to themselves, and but rarely in those of species belonging to different Families and different Orders, and one of them, *Cec. albovittata* n. sp., so closely resembling a true gall-making Gall-gnat, *Cec. s. batatas* n. sp., that at the first glance they can only be distinguished by a trifling difference in size—after we have remarked that even authors, like Osten Sacken, who cannot be supposed to be led away by any visionary theories, have dilated upon the great apparent similarity between several species of true, gall-making Gall-flies and the Guest Gall-flies that intrude upon their homes (*Proc. Ent. Soc. Phil.* II. p. 34)—the mind naturally enquires, what is THE MEANING of these and similar phenomena? Natural History is not, as some have foolishly supposed, a mere bundle of dry facts. These, it is true, form the foundation upon which we must build, and, without such a solid and immoveable base to build on, the whole edifice will crumble to dust with the first blast that assails it. But Science, to be worthy of that high and holy name, must not be contented with mere facts. Her aim is to generalize upon those facts, when a sufficient number of them has been accumulated—to curiously pry into the laws which govern the great system of which we ourselves form but an infinitesimally small fragment—to ascend from minute details to broad and sweeping inductions—in a word, to solve the great mystery of the Creation and explain to us how, and why, and wherefore we exist.

Geology has already told us much on this subject. Zoology, her sister and hand-maiden, has also told us much and can tell us much more. The GEOGRAPHICAL DISTRIBUTION of species demonstrates, that they cannot have all spread in their present specific types from one common centre of creation, and that if we assume several distinct centres of creation within the present geological epoch, we must assume at least a thousand of them; and even then the occurrence of very many identical species in faunas and floras which, as Geology teaches us, were separated by insurmountable physical barriers long before the present geological epoch commenced, and have continued to be so separated ever since, forms an almost insuperable objection to the hypothesis. The only other assumption that we can make—after rejecting the above two—is that species were not created in their present specific types, but are genetically derived from pre-existing species. The UNITY OF COLORATION, both as regards the shade of color and the pattern or design, which prevails almost everywhere in Nature in the same group of species, likewise indicates by unmistakeable tokens a genetic connection between the different species of those groups. There is actually, as I have attempted to show, a very general PHYTOPHAGIC UNITY in those genera of insects which in the larva state feed upon plants; for it is very commonly the case that certain genera of insects inhabit, more or less exclusively, certain genera of plants; and I believe that when one species of a given genus of gall-making insects is found on a given genus of plants, there can be almost universally many more species of the same genus found there. At all events, the Gall-gnats of the Willow offer a memorable illustration of this rule; for before this Paper appeared but a single N. A. species was known to the scientific world, and I have discovered at least fourteen additional species, and doubtless many more remain to be discovered. To say, by way of explanation of these and similar phenomena, that they are so because the Great Author of Nature has willed them to be so, is no explanation at all, but simply a woman's reason—it is so, because it is so. If I were to go into a large stable of horses, and find some of them fed exclusively on maize, some exclusively on oats, some exclusively on hay, and some, as usual, on an intermixture of the three kinds of feed, I should naturally ask the horse-keepers what was the reason of this singular anomaly. Would it be any answer for them to say—"It is so, because the Master has willed it to be so"? What I should want to know would be, *why* he willed it to be so, and what possible reason he could have for such a proceeding; and unless they could explain this point, they might just as well hold their tongues. Now the Derivative Theory explains fully and completely what I called just now the PHYTOPHAGIC UNITY of numerous large groups of insects, and it also explains fully and completely that COLORATIONAL UNITY which we find to prevail everywhere in Nature. The Creative Theory has hitherto failed to give any explanation whatever, deserving the name of explanation, of numberless such phenomena as these. What I have called the UNITY OF HABITS (see above p. 570) points like a finger-post in the same direction as the PHYTOPHAGIC UNITY of genera; and there is even, as Prof. Agassiz was perhaps the first to clearly point out, both a UNITY OF VOICE in the same family of animals and also a UNITY OF MOTION. (*Methods of Study*, pp. 121–5.)

It is true that these last three Unities are dependent upon Structure, and as our Systems of Classification are founded upon Structure, we might naturally expect that where the Structure is nearly identical, the Habits, and the Voice, and the Motion should also be nearly identical. But, so far as we can discover, Coloration is entirely independent of Structure, and does not form any part of the basis of our present Classifications, though some Naturalists are beginning to recognize it as of generic value. No man ought to wonder that one *Cicindela*, for example, is structurally like another *Cicindela*, for it is precisely *because* they are structurally alike that both are referred to the same genus; but it is most surprising, that, although Coloration has had nothing to do with their Classification, and there are hundreds of species known and described, there is the same fundamental design or pattern on the elytra of all of them.* On the Creative Theory, who can assign even a probable reason for this and a whole host of similar phenomena? Who can explain why *Gomphus*, of which there are now 86 described species, should always be yellow or greenish-yellow, and, according to Selys and Hagen, have normally 6 black stripes on what is called the dorsum of the thorax? Why *Coccinella* and *Hippodamia* should have red or yellow elytra dotted with black, and *Cicindela* have green or red or brown-black elytra, with all the intermediate grades of color, marked by three white lunules on certain definite parts? Why *Pterostichus* should be black and *Pœcilus* metallic green or blue? Why *Pieris* and *Pontia* should be white spotted with black, and *Hipparchia* and its allies brown with eye-like subterminal spots; while *Melitæa* and *Argynnis* are fulvous or fulvous red above, with crenulate lines and lunules of black on certain fixed parts of the wing?

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* See on this subject Dr. LeConte's Memoir on the Cicindelidæ of the U. S. (*Trans. Am. Phil. Ent. Phil. Soc.* XI. p. 28.) Dr. LeConte found that *C. 4-lineata* Fabr., an East Indian species which has instead of the normal markings "two yellow stripes on each elytrum," had certain structural peculiarities which authorised its being placed in a new genus, *Hypœtha* Lec.

Again, it is difficult to conceive of any peculiarity in structural organization, which can account for the wonderful phenomena of PHYTOPHAGIC UNITY; why, for example, *Cynips* should form galls on the Oak and never on the Rose, and *Rhodites* should form galls on the Rose and never on the Oak; why *Pontia* and *Pieris* should affect cruciferous plants, *Colias* the clovers, *Parnassius* the saxifrages, and *Argynnis* the violets. We find that, even within the boundaries of the United States, the gall-making genus *Cecidomyia* inhabits at least 8 distinct genera of plants. (See above p. 552.) Why are the gall-making genera *Cynips* and *Rhodites* each restricted to a single genus of plants? We find that *Arctia* and its allies are very generally polyphagous, and feed on an almost unlimited number of different genera of plants. Why is *Arctia* polyphagous, and *Pontia* and *Pieris* and *Colias* and *Parnassius* and *Argynnis* generally monophagous? It is inconceivable to me, that in genera all belonging to the same Order, as with these last, there can be fundamental and immutable differences in the structure of their mouths or their stomachs, of such a nature as to enable the one to eat and digest almost anything of a vegetable nature, and to compel the others to restrict themselves, as a general rule, for thousand and thousands of years to one single genus of plants. Look at the exclusively American Lepidopterous family *Dryocampadæ*. Within the limits of the United States there are now known to be eight, or in any case seven species belonging to this family. Six (or five) of them belong to the genus *Dryocampa*, and out of the six (or five) no less than *four*, *pellucida*, *senatoria*, *stigma* and *bicolor*—or, at all events, if *bicolor* be not, as I believe it to be, a true species, no less than *three*—inhabit the Oak in the larva state. Of the remaining two, *rubicunda*, which inhabits the Maple, is rather an aberrant form, and *imperialis*, which inhabits the Sycamore (Platanus), the Pine, the Sweet-gum (Liquidamber) and occasionally the Oak, is a decidedly aberrant form. The other two genera of this family, *Ceratocampa* Harris and *Sphingicampa* Walsh, each containing one N. A. species, are, but more especially the latter, pre-eminently aberrant forms; and it is most remarkable that neither of them has ever been found on the Oak, the former feeding on the Walnut (Juglans), the Hickory (Carya) and the Persimmon (Diospyros), and the latter, so far as hitherto known, feeding exclusively on the Honey-locust (Gleditschia). Now, from the fact that there are two of these *Dryocampa* which do not inhabit the Oak, it is manifest that there can be no generic peculiarity of structure which compels the entire genus to confine themselves to that tree. Why then, out of five or six *Dryocampa*, do as many as three or four inhabit the Oak? Why are they not scattered round amongst our Elms and Ashes and Cherries and Plums and Thorns and Crabs and Willows and Poplars and Beeches? The Theory of Chances demonstrates that this cannot be a merely fortuitous event. There MUST be some cause for it. What is that cause? The Creative Theory is dumb, or tells us that it is so, because it is so; the Derivative Theory answers promptly, clearly and loudly, that it is because all *Dryocampadæ* sprang ages ago from some one pre-existing species, which inhabited the Oak or some preexisting form closely allied to the Oak; and that certain nascent types, in the course of ages, ceased more or less, and at a more or less early period, to feed on the Oak, so as to become isolated from their brethren at a comparatively early date, and have consequently deviated more or less, but always in a far greater degree than the others, from the primordial type, and run into what I have called Phytophagic Species. Look, again. at the cases of the N. A. Gall-gnats (*Cecidomyia*) which form galls on the Willow, and of the N. A. Gall-flies (*Cynips*) which form galls on the Oak. I know from my own observation of both these two groups that, as a general though not as a universal rule, each species is limited to a particular species of the genus of Plants which it inhabits. In the case of the latter, Osten Sacken has shown the same thing, (*Proc. Ent. Soc. Phil.* I. p. 50,) and as to the former, both Loew and Osten Sacken assert it of the whole family of *Cecidomyidæ*. (*Amber-Dipt.* Sill. Journ. XXXVII. p. 309. *Dipt. N. A.* p. 179.) It cannot be said that there is some peculiarity in their generic organisation, which limits them thus to one or other particular species either of Oak or Willow; for there are probably certain species of Gall-gnats which inhabit several species of Willow, and there are most indubitably certain species of Gall-flies which inhabit several species of Oak.* Consequently, whatever the structural character be which limits them to one Willow or one Oak, it must be specific and not generic. Now is it conceivable, so closely as most of these Gall-gnats and many of these Gall-flies are allied, and so closely as most Willows and most Oaks are allied, that there can be fundamental and immutable specific differences in the organization of almost all these N. A. Gall-gnats and Gall-flies, which have compelled them for all time, ever since their first so-called original creation, to inhabit one particular species of Oak or of Willow, and to perish if they are transferred to any other species? Yet, if we believe in the Creative Theory, we are bound to believe this. We are bound to believe, for example, that two distinct species of the Gall-flies of the Oak—*Cynips q. spongifica* O. S. and *C. q. inanis* O. S.—which, if they differ at all in their organization, differ by such exceedingly minute differences, that, on the closest scrutiny under the most powerful

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* The N. A. Oaks (quercus), are divided by Gray into two sections which almost attain a subgeneric value, from the circumstance of the acorns either ripening the

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same year or not till the following year. It is a suggestive, and certainly not a merely fortuitous fact, that those Gall-flies which inhabit promiscuously several species of Oak, confine themselves to one or the other Section or Subgenus: e. g. *Cynips q. globulus* Fitch, occurs on Q. alba and Q. montana, and also, unless I have been deceived by the similarity of the gall, on Q. macrocarpa, all three of them belonging to the first section or subgenus; and *C. q. petiolicola* Bassett occurs on Q. prinus (=Q. montana) and Q. prinoides, all three of them likewise belonging to the first section or subgenus. The rest all occur exclusively on Oaks belonging to the second section or subgenus, viz., *C. q. palustris* O. S. on Q. palustris, Q. tinctoria (=Q. coccinea), Q. imbricaria, Q. falcata and Q. ilicifolia; *C. q. operator* O. S. on Q. nigra, Q. palustris and Q. ilicifolia; and *C. q. Osten Sackenii* Bassett on Q. ilicifolia and Q. coccinea. *C. q. sculpta* Bassett, which Mr. Bassett found on Q. rubra, I have since bred from precisely similar galls on Q. tinctoria; and I found last August and early in September, in very great numbers both on Q. rubra and Q. tinctoria, growing *from the side of the cup of the acorn*, a globular, smooth, plum-like, fleshy, intensely bitter gall, about .50—.75 inch in diameter, mottled with yellowish and crimson outside, and internally yellowish in the centre and towards the circumference pink like a water-melon. This gall, of which I forwarded a specimen to Baron Osten Sacken, is thought by him to be identical with his *Q. juglans*, which was described only from dry, shrivelled-up specimens, and which was stated by Mr. Hitz who found it "to grow on the *branches* of the *White Oak*," (Q alba,) a species that belongs to the first section of Quercus. Either Mr. Hitz must have been mistaken, both as to the tree and the part of the tree on which he found *Q. juglans* O. S., or else my gall is a distinct species. If so, I propose for it the name of *Q. prunus*. It is the only N. A. Cynipidous gall known so far to grow on *the acorn*, though, judging from the names, the European Cynipidous galls, *q. calicis* and *q. baccarum*, grow the one on the cup of the acorn, like *q. prunus*, and the other on the acorn itself.

glasses, neither Baron Osten Sacken nor myself can discover any distinctions whatever between them, have yet retained these infinitesimally minute distinctive characters unchanged and unimpaired for 5,000 or 50,000 or 500,000 years, or whatever other limit we may choose to assign to the present Geological era. I could as soon believe that it is possible, by the most unremitting attention, to propagate the same breed of cattle, without losing or in any wise changing a single point that characterizes the breed, for 1000 years; whereas we know that it is practically impossible to do this even for 30 or 40 years.

If, indeed, we only met with these Colorational and Phytophagic Unities in one geographical district, we might suppose them to be caused by some peculiarities of climate. But go where you will, the same universal laws follow you. The *Cynips* of Europe, like their American congeners, inhabit the Oak and not the Rose, and the *Rhodites* of Europe, like the *Rhodites* of the U. S., are found exclusively on the Rose and never on the Oak. The *Gomphus* from Japan and the *Gomphus* from the Kurile Islands have the same yellowish ground-color, and the same black stripes on the thorax, as the *Gomphus* of North America and the *Gomphus* of Europe. The *Cicindela* from Hindostan, so far as regards the elaborate pattern traced on its elytra, is as like as two peas to the *Cicindela* of the United States and the *Cicindela* of England. And the same law holds good on both sides of the Atlantic, as regards both the coloration and the food-plant of *Pontia*, and *Pieris*, and *Colias*, and *Argynnis*, and *Hipparchia*.

These illustrations might be indefinitely prolonged; but every naturalist can supply the deficiency from facts which have come under his own observation, and I only refer to them here because they have scarcely been touched upon in Darwin's great work. The absolute identity in the imago state of several distinct species of *Cecidomyia*, as shown in this Paper—the absolute identity in the imago state of two distinct species of *Halesidota*, which I have demonstrated in a preceding Paper—the COLORATIONAL UNITY so especially remarkable in Insecta, where we have so large a number of species to generalize upon—the PHYTOPHAGIC UNITY of very many genera of Insects—like myriads of other facts enumerated in the Origin of Species, all cry out with one voice, that species are connected by a genetic bond—that they were not independently created, but derived by gradual modification during indefinitely long periods of time from pre-existing species—that the Great Author of Nature constructed his primordial Cosmos in so perfect a manner, that ever thereafter it needed no interference on his part—that it is not like the bungling machines put together by human hands, which wear out in a few years and require constant attention and supervision—but that, without any miraculous interposition on the part of the Creator, the Creation has heretofore run, and will continue hereafter to run its appointed course, one geological epoch gradually succeeding to another, and one species gradually arising from and supplanting another, till it shall seem fit to the Great First Cause to destroy that work which, when he called it into being, "he saw to be good," good not only for one brief geological era but for all time.

ROCK ISLAND, ILLINOIS, Dec 14, 1864.

POSTSCRIPT.

Since my remarks on the "Unity of Habits" in Insects were in print, (pp. 567, 570, 574,) I have been much pleased to find that Professor Agassiz recognizes the same great Law, with apparently the same limitations, as regards animals generally, and extends it not only to the genus, as I have done, but to the family. "The more I learn upon this subject," he says, "the more am I struck with the similarity in the very movements, the GENERAL HABITS, and even the intonation of the voices of animals, belonging to the same family." (*Essay Classif.* p. 59.)

It may be asked how I, who believe firmly in the Derivative Origin of Species, can believe that it is impossible for species of the same genus to have several heterogeneous and widely different habits. "Your *Unity of Habits*," it may be objected, "is irreconcileable with the theory of the gradual development of existing species from pre-existing species. If one species is derived from another, must not the new species, while in an incipient state, differ in its organization and often in its habits from what may be called the mother-species? May not the *Cecidomyia* that are said by Wagner to procreate in the larva state, be simply a new genus in an incipient or nascent condition, that will hereafter perhaps become developed into a whole family of insects having the same peculiar and extraordinary habits?" I reply, in the words of Linnæus, *Natura non agit per saltum*. If Nature wished to construct a race of insects, that should habitually commence making new individuals before they had finished making themselves, in other words, if Nature wanted *larvæ* and *pupæ* to procreate as well as imagos, she would begin by making *pupæ* procreate. Now, even in those genera where the pupa is to all external appearance almost undistinguishable from the imago, such as the short-winged Grasshoppers, I know from long observation that the pupæ never copulate. Neither is there any case in any other family of insects, where it has been proved that true pupæ copulate; for Westwood has shown satisfactorily, that certain apterous dimorphous forms in Heteroptera, which have been found in copulation, are essentially distinct from the true pupæ in having no rudimental wings, and are to all intents and purposes mere wingless imagos. (*Intr.* II. pp. 468–70.) Again, if Nature wished to construct an insect that was viviparous and not oviparous, she would begin by making the imago ovo-viviparous, and finally, after a long series of new species and new genera, viviparous; and she would scarcely accumulate two anomalies in the same species—the anomaly of generative larvæ, and the anomaly of viviparous reproduction. Least of all would she treble the anomaly, by superadding in the given species the necessity of parthenogenetic reproduction, which appears to be the necessary condition of Wagner's larvæ, seeing that no Dipterous larvæ have their reproductive organs developed. When Nature determined to construct a viviparous vertebrate animal, she did not cause a species of some oviparous genus of Birds to become at once, *per saltum*, viviparous; but she first, by a long series of gradations which have now become extinct, called into existence the *Ornithorhynchus*, a true mammal which nevertheless lays eggs like a bird; then, by another long series of extinct gradations, the Marsupials, which bring forth half-developed young, or, so to speak, lay eggs which are half hatched out; and finally, by another long series of extinct gradations, the perfectly viviparous Mammals. We see incipient traces of the same process in the Flesh-fly (*Sarcophaga*) and other ovo-viviparous animals, and a more complete development of it in the Dipterous *Pupipara*, which retain the egg in their bodies till it has become a mature larva and assumed the puparium. We see the first traces of the steps by which the true Mammals that suckle their young have been developed out of Birds, in the Pigeons, that secrete a milky substance from their craws and disgorge it into the mouths of their nestlings, though we nowhere find a true Bird with complete teats like a Mammal. We see the last steps of the process, by which Land Birds have been developed out of Aquatic Birds, in the European Water-ousel, which is a true Thrush and yet dives like a Loon; and we see the beginnings of the same process in the N. A. wood-duck (Anas sponsa), which is a true Duck and yet habitually perches upon trees and builds in the holes of trees. We see the ultimate steps, by which insectivorous aquatic Coleoptera have been converted into insectivorous terrestrial Coleoptera, in the Geodephagous genus *Omophron*, which has the shape and the general appearance of the Hydradephagous genus *Hydroporus* (*Hygrotus*), and to this day is always found on the borders of streams. We see the same thing in the Geodephagous *Oodes fluvialis* Lec., which I often find adhering to the under surface of partly submerged logs, and which, when endeavoring to escape, generally makes for the water, and as soon as it has reached it dives out of sight in a moment like any *Colymbetes*. We see the incipient steps of the same process in the European Hydradephagous genus *Pelobius*, which inhabits the water and yet has gressorial legs like a *Carabus*, and, unless my recollection of *P. Hermanni* deceives me, has also a distinct neck, like most Geodephaga, except *Omophron*, and unlike most Hydradephaga, except *Haliplus* and *Cnemidotus*. But in all these, and a hundred similar cases, the steps by which the process is accomplished are slow and gradual, and there is no sudden leap, as there would be if a Duck had teats and gave suck, or if a Bear laid eggs and incubated them, or if one *Cecidomyia* copulated and laid eggs in the normal manner in the imago state, and another *Cecidomyia* was viviparous by parthenogenesis in the larva state. I do not contend that there is never *any* difference in the habits of the species comprehended under a given genus, but only that there is never any radical and fundamental difference, of such a nature, for example, as that there can scarcely exist any intermediate grades between the normal and the differing forms. Now an insect, if it procreate at all, must procreate either in the larva, or in the pupa, or in the imago state, and there cannot scarcely be any intermediate grades between these three. Therefore I maintain that no two of these three can co-exist in one and the same genus, *Cecidomyia*.

Another thing. It appears that these supposed young Cecidomyious larvæ, which are said by Wagner and others to be viviparously produced, are not born in the manner which, so far as I am aware, is universal with all viviparous animals, but eat their way out of the body of the so-called mother-insect. This alone is an anomaly, which, if there were no other reason to discredit Wagner's theory, would tend to involve it in the gravest suspicion. But to dwell on minor points like these is useless, and seems like straining at a Gnat and swallowing a Camel. Those that reject as incredible the fact of the existence of procreative larvæ, and of distinct species of one and the same genus procreating in two widely distinct and heterogeneous manners, do not need such arguments; and those that have sufficient faith to digest these startling anomalies, are beyond the reach of pop-guns, and can be effectually attacked only by cannon of the very largest calibre.

If it were not almost a work of supererogation to quote examples of grievous mistakes made by scientific men, and adopted and believed in for a long time by other scientific men, I might instance the well-known experiments of Cross, which were supposed to demonstrate, that a certain species of Mite (*Acarus*) was generated spontaneously, or in plain English created, by the hands of the manipulator. Yet who at the present day believes that Mites can be created by Man? I might instance also the conclusion arrived at by Rudolphi in his latest work on Entozoa (Intestinal Worms), viz. that these animals, or some of them at all events, must be spontaneously generated, because he demonstrates at great length the impossibility of their being normally generated in any one of what seemed to him all the possible modes. He little thought, when he announced this startling conclusion, that it would hereafter be proved, that what he considered as distinct families of Entozoa, were merely the larval forms of other families; and that the small, bladder-like worm from the liver of a hog could pass into the human body and become metamorphosed into twenty yards of Tapeworm. I remember well that, thirty years ago, the veteran geologist Prof. Sedgwick, when I informed him of the conclusions at which Rudolphi had arrived, remarked to me that he would not believe in them, even if a hundred eye-witnesses were to testify to the truth of the facts upon which those conclusions were based.

Notes on some SPHINGIDÆ of the State of New York, with Descriptions of their Larvæ and Pupæ.

By J. A. LINTNER, Utica, N. Y.

It is not deemed necessary to offer an apology for presenting in the present paper, descriptions at considerable length of the larval and pupal states of our Sphinges. The value of the knowledge of the earlier stages of Insect life has long since been recognized, and is justly regarded as of the utmost importance in the proper determination of species,* and as the only means of effectually preventing the errors which are continually being made of sexes and varieties described as species, and veritable species degraded to simple varieties.

And beside the mere utility of such knowledge, every faithful student will welcome each contribution, however trivial, which shall aid the progress of his much loved study, and hasten the day when it shall occupy the advanced ground now held by kindred sciences, when of each insect,—ovum, larva, pupa and imago shall be known, described and figured, and the discovery of a new microlepidopter shall be a triumph.

Of some of the larvæ herein noticed, such features only are mentioned as had been previously omitted; several, of which there exist but vague descriptions, are given more fully; and a few are now described for the first time.

Up to the present it has not been possible, from published descriptions, to determine the species of a single pupa of our Sphinges; it is believed that those now given will be found sufficient for their identification, although an extremely limited range of color and comparatively slight variation of form, permit the presentation of but few prominent characteristic features.

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* It having been shown that in Halesidota, Walker (=Lophocampa. Harris), two species (*H. Antiphola* Walsh, and *H. tessalaris* Sm. and Ab.) which are quite distinct in the larva, are undistinguishable in the ♂ and ♀ imago, and that in Dryocampadæ two species (*Dryocampa bicolor* Harris, and *Sphingicampa distigma* Walsh), the larvæ of which are totally unlike each other, are also undistinguishable in the ♂ imago,—the importance of carefully studying the larva state of every insect becomes at once apparent. *Walsh, in Proceed. Boston Soc. Nat. Hist.* Vol. IX. p. 294.

SESIA THYSBE Fabr.

Larva. 1.75 in. long, .28 in. broad. Head elliptical, granulated, dull green; when at rest, partially buried within the first segment. Mandibles yellow, black tipped. Body tapering anteriorly from the seventh segment, clear green, lighter dorsally, shading darker to the stigmata, below which to the prolegs it is of a uniform darker hue; underneath, from the third pair of legs to the terminal pair, dull rose, bordered externally by a buff stripe, continued to the sixth segment, and inflated above the prolegs. First segment carinated on its anterior margin superiorly, upon which are about sixteen light yellow granulations. Collar studded with smaller light green granulations. Vascular stripe, bordered by two white lines, commencing on the second segment, becoming wider and more distinct on the central segments, and uniting anterior to the base of the caudal horn. A white, sometimes yellow-green subdorsal line, commencing on the second segment, running midway between the stigmata and dorsum, and terminating in the sides of the caudal horn, made up of a white spot on each annulation, except on the smooth eleventh segment, where it is continuous; white ocellations on the annulations above the stigmata. Stigmata red, with a white dot at each extremity. Caudal horn, .2 in. long, curved, light blue, yellow tipped, granulated with white laterally, with black anteriorly, and a few black granulations posteriorly. Caudal shield and plates granulated like the collar. Legs, basal joint black, tips red. Prolegs green, with a fusiform black spot exteriorly.

Feeds on the Snow-ball (*Viburnum opulus*) during the last of August and first of September. For the knowledge of the food-plant of this larva I am indebted to Mr. Gregg Johnson, of this city, who informs me that for several years he has found it to be quite common, several usually occurring on the same shrub.

Its readiness for pupation is indicated by a marked change of color, noticeable about twenty-four hours before it commences the construction of its imperfect cocoon, which is composed merely of a few leaves drawn together by a very slight spinning, and placed in an angle of the box in which it is confined. Its head changes to purple; the granulations of the first segment, ochre-yellow; between the sub-dorsal lines, purple or reddish-brown; laterally and ventrally, pea green.

Pupa. 1 in. to 1.10 in. long, .30 in. broad at the seventh segment,* tapering thence regularly to the extremities; entire surface shagreened. Color, brownish-black, with reddish-brown on the moveable segments posteriorly—and anterior to the stigmata, prominent transverse wrinkles—showing only when these segments are bent on one side, as they usually are, to such a degree as to bring the terminal spine at nearly a right angle with the central segments. Segments third to eighth inclusive prominently ridged transversely. Head-case produced, subtriangular anteriorly. Antennæ-cases terminating midway between the tips of the middle and posterior leg-cases in the ♀ Tongue-case buried. Stigmata brown, oval. Terminal spine broad at base, prominent, flat,

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*The segments of the pupa, exclusive of the head-case, are of the typical number of twelve, as in the larva, although some of them are so reduced in size, as not to be readily distinguishable. The stigmata number two less than those of the larva, viz: sixteen. The first segment in the *Sphingidæ* is represented by a short dorsal piece attached to the head-case, having at its lateral posterior angle the first stigma. The second segment is indicated by a large dorsal, hexagonal piece between the bases of the anterior wings. The third segment is quite short, is marked with plaits or ridges which are constant and characteristic, and is found between the bases of the posterior wings: these three are known as the thoracic segments. Following them are the abdominal segments, the first of which is similar to, but larger than the preceding—is also without a stigma, and constitutes the fourth segment. On the fifth segment is the second stigma, sometimes partially hidden by the overlapping hind margin of the posterior wing-case. The sixth and seventh segments have each a stigma—the seventh is usually the longest and broadest of all, and is that upon the posterior margin of which, the wing-cases terminate. The preceding segments are immoveable, from the attachment to them inferiorly of the leg-, antennæ- and wing-cases. Segments eighth to eleventh are entire, move freely one upon the other, and are furnished with stigmata. The twelfth segment is without a stigma, is the shortest of all, and has attached to it an immoveable plate, covering the anal organs—the intermediate suture obsolete superiorly. The anal plàte terminates in a spine, of greater or less prominence.

Ventrally, are seen the anterior wing-cases, overlying the posterior, but permitting a small portion of their inner margin to be seen on the fourth, fifth and sixth segments. Of the leg-cases, the anterior and middle ones are alone visible, the posterior ones being hidden beneath the wings. The tongue case, in those species in which the tongue is as long, or nearly as long as the body, has a portion exserted. The remainder is buried, and usually extends in a separate case for each filament, to the tips of the wings. In *Smerinthus* and other genera in which the tongue is nearly obsolete, the pupa is without a visible tongue-case.

rounded toward the tip, showing under a lens a marginal row of about ten delicate curved reflected spines on each side, and a larger terminal double hook, by which the pupa is attached to some transverse threads in its cocoon. 2 ♀.

The *Imago* appears early in May, probably as early as *diffinis*, Boisd. which I have taken May 12th. It is often seen by day, feeding from the blossoms of the Phlox of our gardens, and has been observed to frequent the blossoms of the common Lilac, at twilight.

SPHINX QUINQUEMACULATA Stephens.

The *young larva* is of a delicate light green color, acutely granulated, especially when it has recently moulted, resembling in its roughness a *Smerinthus*.

The *mature larva* differs in color in different individuals to a degree far exceeding any other with which I am acquainted. Its usual color, by which it is generally known from its common occurrence on the tomato, is a dull green, with yellowish-white lateral bands, with a peculiar shiny appearance of the skin when at its maximum size. Occasionally the following variety is met with:

Sea-green variety. Head and collar glossy black. Body dull sea-green, with the usual ocellated spots on the annulations almost obsolete posteriorly. The lateral and connecting stigmatal bands, margin of caudal shield, and an elongated triangular spot on the head, flesh color. Legs, exterior of prolegs, caudal shield and plates, shining black. Ventral region lighter green.

Among a large number of the larvæ which were brought me, taken from a field of tobacco, several were found of the following variety, which, from their food-plant and abnormal coloration, I confidently expected to give me the *Carolina*, but when reared I obtained an Imago in no respect differing from those bred from the ordinary green tomato larva:

Brown variety. Head black, large, with a triangular drab spot centrally, and a lateral linear one. Body, very dark brown, sprinkled with numerous raised yellow dots, showing minute ocellations under a lens. Seven yellow lateral bands. The stigmatal bands yellow. Caudal shield yellow bordered. Tips of legs, collar, caudal shield and plates, glossy black. Caudal horn black, .3 in. long, studded with short spines. Stigmata broadly oval and bordered with violet.

Black variety. An impression that I had some years since, seen those which were *black*, is confirmed by Mr. Egbert Bagg Jr., of this city, who assures me that this season, nearly all those which were found upon a tomato-patch visited by him, were perfectly black. Another gentleman informs me, that among a number taken from the tobacco, were several black ones—not dark brown, but unmistakeably black—and that they were of a larger size than the green. I regret that I have no description of this interesting variety.

In another species of this genus—*S. cingulata*—we are presented with a range of coloration nearly as great, an account of which, for the sake of comparison, I have transcribed and introduced in this paper.

Can these differences be sexual? In Clemens' Synopsis of the Sphingidæ, the larva of *Thyreus Abbotii* is described as differing materially in color in the sexes, viz: ♂, reddish-brown, with numerous dorsal patches of light green, and lateral triangular ones; ♀, uniform reddish-brown or blackish-brown, immaculate.

Probably no one who has reared *quinquemaculata* has failed of noting with great surprise the wonderful voracity of the larva. If furnished with what would seem an inordinate quantity of food, in an unexpectedly brief space of time, only the naked stems remain. Unless disturbed, it continues eating without cessation, night and day. The rapidity with which a leaf disappears before it, is almost marvellous, and will account for the phenomenon sometimes presented in our gardens of a tomato-patch almost defoliated before the first attack had been observed. When nearly mature, it often resorts to the tomato itself, as if feeding on the leaves were too slow an operation to satisfy its craving appetite.

Instances are related of the poisonous effects of the bite of this caterpillar, where a high degree of inflammation, swelling and severe pain has resulted,—in one case, as narrated to me, terminating in death. Until established by undoubted testimony, statements so improbable are not entitled to belief. Among hundreds of Sphinx and other Lepidopterous larvæ handled by me—many of them roughly—in not one instance has the disposition to inflict a bite been observed, even under the provocation of confinement in the hand.

The *Pupa* is frequently met with in the Fall in digging potatoes, upon which plant also the larva is said to feed, and from its long arched tongue-case, is a well known object of interest. It is 2.25 in. long, .60

in. broad, nearly plane dorsally, and quite convex ventrally. Color, chesnut brown, on the posterior margins of the segments dark brown. Head-case sub-quadrangular as seen from above, and quite prominent. Tongue-case dark brown, 1.25 in. long in its exterior curve, projecting beyond the head-case, rising from .15 to .18 in. above the breast, regularly ridged transversely and bicarinated medially, terminating between the tips of the antennæ-cases in a conspicuous bulb; the buried portion extending just beyond the tips of the wing-cases. Third segment with a central dark brown fold reflected posteriorly. The fourth, fifth and sixth segments with dorsal transverse wrinkles. Abdominal segments with numerous impressed points, except on their anterior margin, where they are conspicuously indented. Anal segment terminating in a short. triangular, flattened projection, not spinous. 1 ♂, 2 ♀.

Unlike most of the Sphinges, this species is very easily reared. I know of no parasite which attacks the larva. When mature, if merely inclosed in a box, without providing it with earth, it undergoes its pupal transformation, and with very little care, beyond simple exclusion from the light, seldom fails of giving out the imago in due time. Very rarely, its final transformation is delayed until the second summer.

SPHINX CINGULATA Fab.

The *larva* of this species presents a great number of varieties, which reduce themselves to two principal types—those of a green ground, and those of a brown. Of the former there are found three varieties:

The *first variety*, which is that which is met with most ordinarily, is of a dark green, with seven oblique black bands on the sides, which terminate on the back in two longitudinal stripes of the same color, often indistinctly marked, and always interrupted at the incisures. These bands, which commence on the fourth segment, and of which the last terminates in the horn, are lightly bordered with white inferiorly. On the dorsum of third and fourth segments there are two black spots, four very small on the tenth, and two very large placed laterally on the incisure of the first and second segments. Head green, slightly yellowish, with five black perpendicular lines, of which the middle one is divided in two inferiorly. Legs blackish, and prolegs green, with the crown gray. Caudal horn smooth, yellow or ferruginous, with a black tip. The stigmata are covered by some orbicular black spots. The caudal shield is orange-yellow.

The *second variety* does not differ from that above described, except by its being of a clearer green, with the oblique lateral bands entirely white, and that the two dorsal stripes are replaced by two rows of black points

The *third variety* is of a dull green, with six longitudinal rows of blackish or brownish spots, and the head and horn ferruginous.

The individuals of the brown ground also offer three varieties equally well marked, of which the first—the most common—has been represented by Duponchel in his *Iconographie des Chenilles:*

The *first variety* is of a dead-leaf brown on the back, white on the sides, and flesh color ventrally, with seven oblique bands on the sides of a deeper brown, and a lateral stripe of straw color, which is continuous on the first three segments, and which, beginning on the fourth. is interrupted on the middle of each. The stigmata are bordered with white, and placed on some brown orbicular spots, which unite with the oblique bands above mentioned. The head is of a pale fawn, with the same black lines as in the first green variety above described. The legs are blackish and the prolegs flesh color, with the crown gray. The caudal shield is orange-yellow and the caudal horn entirely black.

In the *second variety* there are four longitudinal lines of a dirty white on the first three segments, of which two are dorsal and two are lateral, with two points of the same color on the four segments placed near the incisures.

The *third variety* is entirely of an earthy brown, with the back and the oblique bands of a deeper brown.

Besides these six varieties, intermediate ones are met with, but in all those of a brown ground the body is annulated with numerous blackish furrowed lines, which are cut by others longitudinally, forming small squares.

The larva feeds on the different species of *Convolvulus*. It hides itself at the base of the plant, under the leaves, but may be easily discovered from its large excrements. It enters the ground for transformation.

The *pupa* is yellowish-brown, with the tongue-case very long, detached from the breast, and half-rolled in a spiral at its tip.

The *imago* appears in September of the same year, from larvæ which transform in July. Those which are later in changing, pass the winter in the pupa state, and disclose in May or June of the following year.

It occurs in all the temperate parts of Europe. It is found also in Africa, in the East Indies, and according to Boisduval, in the islands of the Pacific Ocean. *Chenu's Insectes Lépidoptéres*, p. 269–71.

On this continent, it extends throughout the tropics, and north into Pennsylvania. The larval description given by Abbot and Smith (under the name of *convolvuli*) differs so essentially from the above as hardly to be referable to the same species.

The following quaint description of this species is extracted from *Mademoiselle De Merian's Histoire Generale des Insectes de Surinam* —a very valuable work, now almost out of print,—a fine edition of which, in folio, published at Paris in 1771, is in the possession of John Gebhard, Jr , Esq., of Schoharie, N. Y.:

> The caterpillar is rarely met with; it inhabits ordinarily fields of grain, and feeds on the roots of the *Yvraye*. It is of a clear brown color, striped and spotted in an obscure shade. The last of July I placed one in a box with some ground, where it made a round deep hole; entering therein, it covered the cavity with some leaves, and transformed into a pupa, which was green on the breast and black on the back. The following day it became brown, with two small protuberances on the sides similar to eyes, and between the two a curved horn; it moved about with much force.
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> At the end of September it came out a large moth, which had the front of the body and the wings of a gray cinder, ornamented with black. On the wings could be seen distinctly the Roman letters B, C, U and M. It had before its head a long brown tube, which, at some distance from the head, divided in two, and was capable of being entwined on each side, and also of being extended at length. The body above was of a clear red, striped with black, with an ash gray stripe along its back. The whole body was bristling with hairs, or with downy plumes. During the day it was quiet, but flew about at night, making a great humming, in keeping with its great size.

SPHINX ———?

Young Larva; previous to its final moulting, 1.25 in. long; apple-green; a horn like projection of the anterior portion of the second segment, on each side of which are two light purple blotches, of which the anterior one is the larger; one or two similar spots on each side of the caudal horn, and a few purplish dorsal dots. Caudal horn short, blunt, slightly curved.

The above description is from memory. The larva was taken on the 9th of August, feeding on Spearmint, (*Mentha viridis*) and not having matured, descriptive notes were omitted at the time. It remained motionless during the day on the twig upon which it was taken, without the indications of approaching change usually so noticeable in the larvæ of the Sphingidæ. The following morning it had moulted, and so remarkable had been its transformation that it could not have been recognized as the same larva. Of its cast-off skin there remained but the head-case and a fragment of its terminal portion adhering to the stem.

Mature Larva. 2.10 to 2.75 in. long, .35 in. broad. Head small, suboval, flattened in front, dark brown, lighter posteriorly and on the apex, with whitish lateral stripes. Body cylindrical. The abdominal segments reddish-brown, with numerous tan color (sometimes whitish) ocellated spots on the annulations, of which the ocelli are brown or black. The first segment, not visible when at rest, light brown superiorly, olive-brown laterally; the collar light brown, outlined with black. The anterior of the second segment triangular as seen from above and laterally, with the apex slightly rounded—extending horizontally and beyond the head when at rest—olive-brown laterally, with a small black velvety spot anteriorly on the incisure of first and second segments, not visible when contracted. The second and third segments olive-brown laterally, and dorsally a black velvety spot, extending over one-half of the former and two-thirds of the latter—acutely pointed anteriorly and rectangulated laterally near its base, which is one-half of its diameter—in general shape resembling that of a spear-head—bordered, except behind, by white or light buff, shading into the brown of the body. Seven lateral bands of whitish ocellated spots, crossing one segment, and bordered posteriorly with darker brown, which is continued nearly across the following segment. The vascular line obsolete. Caudal horn dark brown, .10 in. long, curved, granulated, shriveled, as if about to disappear. Legs and prolegs black.

As it approaches pupation, its color changes to dull purple, the thoracic spot is rounded laterally where previously angulated, the sides sub-parallel, rounding into the apex which is sometimes acutely pointed, sometimes truncate—in the former case resembling an Indian arrowhead. Caudal horn nearly obsolete.

I have also taken this larva twice on the Wild Bergamot (*Monarda fistulosa*) late in September. It feeds at first on the leaves, and subsequently, when it has nearly attained its growth, on the blossoms. It eats rapidly and rests frequently, at which times it porrects its head at a right angle with its body, and closely folds against it, its three pairs of legs. After maturity it does not assume this position, even if provoked by the finger, but crawls about with restless activity. Buried in the ground August 10th and 25th, where it constructs a ground cell at the ordinary depth.

Of four larvæ taken, I have not been able to obtain the imago, each having died while in pupation, one after having retained its vitality until the second summer. It has probably not been hitherto described. From the long tongue-case of the pupa it would seem to belong to Walker's group of *Macrosila*, but of the species therein embraced none of the larval descriptions are applicable to it; that of *cingulata* by Abbot and Smith approaches it in the " diamond shaped blackish brown patches anteriorly, but differs in most of the other particulars.

Pupa. 1.60 in. long, .40 in. broad; chesnut brown. Head-case sub-triangular, extending by more than the length of the first segment beyond it, and somewhat beyond the base of the tongue-case. Tips of the antennæ-cases in the ♂ * reaching very nearly to the tips of the middle leg-cases. The exserted tongue-case dark brown, .40 in. long in its exterior curve, nearly straight, slightly raised from the breast by its terminal bulb, marked with transverse confluent wrinkles and a medial ridge; the buried portion of the tongue-case extends beyond the tips of the wing-cases. First segment inclined at an angle of about 45°, with wrinkles radiating from its medial line; first stigma dark

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* The following description of that portion of the pupa case which covers the anal and generative organs, is drawn from a number of *C. quadricornis* pupæ: with some slight modifications, resulting from a greater or less degree of development, it is believed that it will serve to indicate the sexes of all the Sphinges:

In the ♂, the eleventh segment inferiorly is similar to the preceding one, and its posterior incisure is uninterrupted and rectilinear. On the twelfth segment, occupying its length, which is quite short, are two prominent elongated granulations, divided by a deeply impressed line. Posterior to this is the anal plate, having a central sulcus, with prominent margins, within a sub-oval, smooth, depressed spot, and is similar in both sexes.

In the ♀, the eleventh segment inferiorly is marked with an impressed medial line, on each side of which, near the middle of the segment, is a small elongated granulation; posterior to which, and extending on the twelfth segment, is a sub-oval smooth spot, through which the impressed medial line is continued; the intermediate incisure is interrupted by the smooth spot, and (in some species) is bent in an angle directed anteriorly.

brown, linear. Second segment protuberant centrally. Third segment with a dark brown nearly central plait, bisected medially by some granulations. Abdominal segments minutely wrinkled transversely, punctulated anteriorly; the posterior segments conical and contracted. Terminal spine .12 in. long, flat, attenuated, granulated, slightly bifid under a lens. 3 ♂.

Its pupation is in a ground cell, at the ordinary depth. The pupa usually has its posterior segments bent on one side. For one now in my possession, the larva of which was taken in August last, and from which I hope to determine the species, I am under obligations to Mr. Gregg Johnson.

SPHINX CINEREA Harris.

Larva. 3 in. to 3.25 in. long; cylindrical, greenish white, shading into white dorsally. Head semi-oval, flat, green, with yellow lateral lines. The thoracic segments transparent, more tinged with green; a few small granulations on the annulations of the segments, which are yellow-green laterally and white dorsally. The seven lateral bands pale yellow, edged with darker green anteriorly, traversing the entire segment above the stigma and continued over six-eighths of the following, in white edged with pale green above. Stigmata linear, bordered with white. Caudal horn rose color, long, curved, with a prominent base, sometimes tipped with blue. Caudal shield edged with light green. Legs rose color.

Feeds on the Lilac, from one bush of which six were collected on the 20th day of August, nearly full grown. From its being so seldom taken, while its imago is perhaps the most common of the Sphinges, its occurrence on the Lilac which has hitherto been alone given as its food-plant, is undoubtedly exceptional. It has been taken by W. H. Edwards, Esq., on the White Ash (*Fraxinus Americanus.*) Mr. Samuel F. Bagg, of this city, informs me that he has found it near a hedge of Privet (*Ligustrum vulgare*), upon which he subsequently matured it. It may also be searched for on the Fringe tree (*Chionanthus Virginica*) and on other species of *Fraxinus*, as it probably ranges over the entire Order of our *Oleaceæ*.

Pupa. 2 in. long, .60 broad. Chesnut brown. Head-case depressed, projecting by nearly the length of the first segment beyond it. Tongue-case—its base anteriorly advanced nearly to the vertex of the head-case, regularly ridged transversely, with a medial impressed line having moderately elevated margins—its trunk raised by one-half its diameter from the breast, the tip applied to the breast and slightly bulbous; the buried portion of the tongue-case smooth, extending to the tips of the wing-cases, which are also smooth. Anterior leg-case with a prominence over the femur. First segment with a smooth dorsal spot, from which wrinkles radiate. Second segment moderately rounded, with interrupted transverse wrinkles dorsally. Third segment with a dark brown central transverse fold, interrupted dorsally. Central segments broader than the thoracic region, moderately punctulated, with dorsal wrinkles and depressions. Eleventh segment with a small dorsal protuberance. Terminal segment quite tapering. Spine short, blunt, wrinkled and bifid. 1 ♂.

The *Imago* frequently enters houses in July, attracted by lights. I have often captured it at twilight, taking its food from the Italian Honeysuckle (*Lonicera Caprifolium*), upon a couple of vines of which, a young lad took, in one evening, ten or twelve, without a net, by simply throwing over them a handkerchief, while a larger number escaped from his rude method of collecting.

A gentleman who had pinned a fresh ♀ of this species upon a fence, where it was forgotten at the time, the following morning found a ♂ in copulation with it. A second one, exposed during the night as an experiment, also drew a mate, which was captured in the morning. *Pteregon inscriptum* Harris, *Thyreus Abbotii* Swainson, *Darapsa Myron* Cramer, and *Smerinthus geminatus* Say, from the breeding cage, are known to have been fertilized in this manner, and broods of the imago reared from their eggs.

It is probable that many, if not all of the Sphinges, when newly emerged, possess the faculty, in common with the Saturnians, although perhaps in a lesser degree, of attracting the ♂; and as several of the species have been known to deposit eggs after being pinned, an excellent opportunity is thus afforded of becoming acquainted with their larvæ, of obtaining bred specimens for our collections always so highly prized, and of ensuring a number of duplicates for exchange.

When the ♀ is of such rarity that its possessor would be unwilling to subject it to the risk of injury from fluttering during a night's exposure, the precaution may be adopted of fastening the wings together over the back by means of a spring. The *patent clothes-pin* with a small spiral brass spring, has been suggested as well adapted for the purpose, if tied by a string at a proper height above the moth.

I would also recommend to those who may capture abroad females of our more rare Sphinges, which, from their fresh appearance and distended abdomens, have probably not oviposited, that, instead of depriving them of life immediately, there should be introduced within their bodies a sufficient quantity of an *old* solution of *cyanide of potassium*,* to permit of their lives being prolonged for a few days. If they have not already deposited their eggs, and their fertilization has taken place, they will, in all probability, relieve themselves of a liberal portion before dying.†

A fine specimen of the rare *Smerinthus Myops* Sm. and Ab., taken the past season by Mr. Charles A. Doolittle, of this city, and kindly presented to me, after having been pinned as above, deposited a number of eggs, but unfortunately, the larvæ from them were not observed in time to supply them with their requisite food.

SPHINX KALMIA Sm. and Ab.

Larva. 3 in. long, cylindrical, segments indistinctly annulated.

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*An aqueous solution of *cyanide of potassium*, is probably the most efficient chemical agent, of which the collector can avail himself, for the prompt destruction of insect life. For its full efficiency, the solution should be newly made. If kept for any length of time, it should be excluded from the light, and tightly corked immediately upon using it. Such is the avidity with which it seizes upon acids, that after a few openings of the bottle, the amount of carbonic acid which it has drawn from the atmosphere, is sufficient for its decomposition.

To use it most advantageously, prick it in the thorax of the insect beneath the wing, with a thorn from the Honey Locust (*Gleditschia triacanthus*)—the regular taper of which constitutes its peculiar merit. Partially withdraw the thorn, that the solution may flow from the point into the wound. A single insertion will almost instantaneously destroy the life of a small insect; for a Sphinx, it would need to be repeated.

†As the above recommendation of a lingering death may reach the eye of some who would regard it as liable to the charge of cruelty, it may be proper to accompany it with the statement of an established physiological fact, well known to Entomologists,—*that from certain peculiarities of nervous structure, the Insect world is almost without the consciousness of pain*—a most benificent provision, in view of their liability to injury, and the general destruction to which they seem doomed, from birds, fishes, and the more rapacious members of their own class.

Head small, flat, suboval, of a clear apple-green, yellowish on the sides, with a lateral black stripe exteriorly. Body apple-green, lighter and of a transparent hue dorsally, deepening laterally. Lateral bands, seven, confined to one segment each, with a sharply defined bordering anteriorly of dark blue almost black, white centrally, and yellow inferiorly. Caudal horn .40 in. long, quite curved, light blue, thickly studded with shining black tubercles, which coalesce at the tip. Caudal shield and anal plates yellow green, dotted with small black elevated points. Stigmata pale orange—their upper portion extending in the yellow of the bands. Legs black, pearly at base. Prolegs with two black spots exteriorly, separated by yellow, or connected posteriorly by a black line.

Feeds upon the Lilac (*Syringa vulgaris* and *S. Persica.*) I have taken it ready for pupation, 25th July, and as late as 20th September. At least three-fourths of those which I have met with, have been stung by its parasite, the grubs of which eat out of the body and cover it with their cocoons (apparently the same as those occurring on *Darapsa Myron*), usually just as the larva has attained its growth.

I regret my inability to give a description of the *Pupa*. Its exserted tongue-case, from my recollection, in length, is intermediate between *drupiferarum* and *cinerea.*

SPHINX DRUPIFERARUM Sm. and Ab.

Larva. 3 inches long, cylindrical, apple-green. Head green, with lateral brown stripes, uniting at the apex, and becoming broader toward the base. Body, with the lateral bands white, bordered anteriorly with violet, and confined to one segment. Stigmata orange. Caudal horn .40 in. long, dark brown.

Taken on the Apple and Plum from August 5th to the 25th, full grown.

Among some notes made by me in 1859, is the following:

August 1st took young larva of Drupiferarum, feeding on the Plum; apparently after its second molting, 1 inch long; its body rough with numerous small granulations, more conspicuous toward the head; *no caudal horn.* Molted August 4th; granulations less prominent; no caudal horn. Escaped before its next molting.

I can only account for the above anomaly of the absence of the horn in this species, by the supposition, that it may have been lost by some accident soon after its birth, and all trace of it obliterated in its subsequent moltings.

Pupa. 1.90 inch long, .50 inch broad. Dark brown. Head-case rounded, quite corrugated, projecting by one-half the length of the first segment beyond it. Exserted tongue-case, .25 in. long in its outward curve, its base anteriorly, opposite to the anterior margin of the first segment, not bulbous at its tip and not resting on the breast,—with an impressed line and confluent transverse wrinkles; the buried portion reaching to the tips of the wing-cases. The anterior leg-cases, prominent over the femur, impressed at the joint between it and the tibia,—both pairs of leg-cases transversely wrinkled. Antennæ-cases in the ♀ not extending to the tips of the anterior leg-cases. Wing-cases transversely wrinkled. First segment depressed anteriorly, corrugated, with a medial line, its stigma quite open. Second segment slightly rounded dorsally, corrugated, with a medial line. Third segment with a subdorsal fusiform depression, and not compressed at the base of the wing-cases. Abdominal segments with conspicuous transverse wrinkles, and numerous punctulations,—those on the anterior wrinkles with elevated margins. Terminal segment in ♀, very full and obtuse. Stigmata, fusiform. ' Spine short, broad, constricted at the base, excavated inferiorly, with a bifid tip. 1 ♀.

I have had the *Imago* of this species to emerge, after two winters passed in the pupa state, although in the same box with others, which made their appearance at the usual time. It attains a large size, occasionally measuring 4.70 in. in expanse of wings. Both the moth and its larva appear to be rare.

PHILAMPELUS SATELLITIA Linn.

Larva. Length when extended, 4 inches—when at rest, with its head and thoracic segments retracted within the fourth segment, 3 inches, and .50 in. broad. Head reddish-brown, small and rounded. Body, of a transparent reddish-brown, lighter dorsally, with small ocellated spots on the annulations. Fifth to tenth segments inclusive, each with an oval cream-colored spot, in which is the stigma. In some individuals, only the superior half of the anterior spot on the fifth segment is given,—in some, its position is merely indicated by a dot, and in others, it is wholly wanting.

Although this larva has frequently come under my observation, feeding both on the Grape and Ampelopsis, and in different stages of its growth, from previous to its third molting to maturity, I have never met with it of the "pale green" color of our published descriptions. In some individuals taken by me, the red hue has prevailed to an extent approaching crimson. It is frequently quite late in maturing. On several occasions I have known it to be caught by the October frosts, before it had undergone its last (fourth) molting. I regret that I cannot give the period of disappearance of the caudal horn, or a more particular description of the larva, which is one of the most beautiful of the Sphinges.

Pupa. 2 in. to 2.25 in. long, .70 in. broad. Chesnut brown. Head-case, prolonged, sub-triangular laterally, slightly corrugated. Wing-cases, smooth, separated by the buried tongue-case, which extends slightly beyond their tips. Tips of antennæ-cases in the ♂ ranging with tips of the anterior legs—in the ♀ not reaching to their tips. Segments with impressed points, more abundant on their anterior portion; the second segment, with a subdorsal depression above the base of the wing-case; the third segment, with three prominent ridges—the central one, which proceeds from the base of the posterior wing-case, divided dorsally by an elevated medial line, connecting the two exterior ones; the fourth segment more elevated than the others; the central segments projecting inferiorly; the terminal segments regularly tapering. Terminal spine long, thick, rounded, rugose, attenuated near the tip, minutely bifid, .10 in. long. 4 ♂, 2 ♀.

The pupation occurs in a ground cell, constructed at a very moderate depth. The pupæ appear to be quite delicate,—three-fourths of their number having failed with me, to mature. I have obtained the *Imago* from a box kept in a warm room near the ceiling, on the 2d of December. It is rarely captured by collectors, and very seldom in good condition.

PHILAMPELUS ACHEMON Drury.

Larva. Length when at rest, 3 inches. Reddish-brown, with a darker dorsal line, and a sub-dorsal one midway between the dorsum and stigmata, bordered inferiorly with lighter brown; below the stigmata, darker brown. The annulations with ocellated spots as in *satellitia.* The lateral spots, cream-colored, each composed of three sub-oval confluént ones, of which the lower one embraces the stigma connecting with its superior margin—the next of equal size or broader—the upper one, quite small, resting on the incisure, near the sub-dorsal line,—the three ranging transversely, and anteriorly from the stigma, unlike the lateral bands of nearly all of the Sphingidæ, which are directed posteriorly.

Pupa. One in my possession which there is every reason for believing it to belong to this species, differs in the following particulars from *satellitia*. The head-case is rather short. The antennæ-cases of the ♀ extend slightly beyond the anterior leg-cases. The elevated medial line of the third segment is prolonged over the posterior ridge to the incisure, and is more prominent. The eleventh segment is broader than the posterior portion of the tenth, and is abruptly rounded. The twelfth segment is sub-rectangular inferiorly, and instead of a terminal spine, it has simply an obtuse tuberculated projection. Size of *satellitia*. The pupal transformation occurs ordinarily about the middle of August.

The *Imago* is met with less frequently than *satellitia*. I have taken it in June, at twilight, about the flowers of the Evening Primrose (*Œnothera biennis*), the culture of which, in a large cluster, I would commend to collectors, from its having given me several of the rarer Sphinges.

DEILEPHILA CHAMÆNERII Harris.

Larva. 3 in. long. Head, dull red, small, exceeding slightly in diameter, the first segment. Body tapering gradually from the ninth segment to the fourth, thence rapidly to the head, and slightly from the ninth posteriorly; incisures, rather deep; color, dark brown, approaching black. The vascular line, dull red. The annulations of the segments conspicuous on their posterior half. Midway between the vascular line and the stigmata, on the central segments, a row of dull white spots, nine in number, placed on the anterior portion of the segment, sub-oval in shape, their longest diameter in line with the body—the last one, elongated, and extending upward to the caudal horn. Beneath these spots, the body is dotted with whitish. Caudal horn, .20 in. long, slightly curved. Stigmata, yellowish.

The larva appears to be rare. I have taken it but once, on August

8th, when full grown, moving rapidly across a road. It buried in the ground the following day.

Rev. Dr. Schmidt, of New York, informs me that he has met with it several times, feeding on Purslane (*Portulacca oleracea*).

Pupa. 1.50 in. long, .40 in. broad. Color pale reddish-brown, mottled with black in its impressed portions. Head-case rounded, corrugated, projecting by one-half more than the length of the first segment beyond it. Tongue-case buried, corrugated, reaching beyond the tips of the wing-cases. Tips of the antennæ-cases, reaching nearly to the tips of the anterior leg-cases in the ♀. Wing-cases, in transverse corrugations and mottlings. Second segment but moderately rounded, darker anteriorly. The third segment, without folds, nearly black. The abdominal segments with confluent punctulations, more distinct on their anterior margin—the black prevailing dorsally. The posterior segments regularly tapering and contracted; the anal plate of small size. Stigmata, black—the first stigma linear. Terminal spine .15 in. long, curved, rounded, granulated, sub-spinous near the tip, regularly tapering to a delicate tip, bifid under a lens. Described from a pupa-case, of which the color may possibly vary from that of the living pupa.

Imago. I have taken it abundantly, on the 25th of May, and for a few days following, about the blossoms of the common Lilac at sunset and during an hour thereafter, in company with *Thyreus Nessus* and *T. Abbotii.* Subsequent annual visits to the same locality have failed to give me a single individual of either of the above species. Although usually commencing its flight at twilight, *chamænerii* has been known to be on the wing in the day time, and to enter houses through open windows.

DEILEPHILA LINEATA Fabr.

Larva. 2.75 in. long. Body tapering as in *chamænerii*, grass green. Midway of stigmata and vascular line, a series of nine lighter green spots, commencing on the third segment, margined above and below with black, which connects anteriorly—the superior margins connected by a delicate black line, forming a stripe from the head to the caudal horn. Horn, .30 in. long, stout, roughly granulated, light green, tipped with black. Stigmata, margined with black.

Taken Oct. 4th, upon the ground; on the 6th, spun some threads in an angle of a box in which it was confined; died without becoming a pupa.

The above description differs in coloration from that given by Harris and others. It is possible that the colors may have undergone some change, from its approach to its pupal state, although I can recall no instance where so long a time as two days has elapsed, after the change of color, before the larva has taken its position for pupation—the usual period being about twenty-four hours.

I have taken the *Imago* the middle of June, about the fragrant Honeysuckle.

DARAPSA MYRON Cramer.

Young Larva, after first molting, .50 in. long, light green, yellow lateral bands running into the yellow subdorsal line. A dorsal series of yellow triangular spots, which on the sixth and seventh segments are centered with orange. Caudal horn green, straight, .20 in. long. It is not until after the last molting that the horn becomes curved.

Mature Larva. Head small, oval, with yellow granulations and four yellow perpendicular lines. Body with fourth and third segments swollen, tapering rapidly from the former to the head; color, yellowish-green, with numerous pale yellow dots. Lateral bands, seven, connecting above, with a white stripe, which borders a darker green subdorsal line, extending from the lateral stripes of the head, nearly horizontally to the tenth segment, upon which it curves upward to the horn. On the three anterior segments the subdorsal line is yellow bordered beneath. Five dorsal spots of pale green, the base of each resting on the anterior of the segment, and the apex on the posterior—having within on the vascular line, a lozenge shaped dull rose spot resting on the anterior incisure of the segment. Caudal horn .25 in. long, bluish-green, granulated anteriorly with black, posteriorly with yellow, and with a yellow tip. Stigmata orange, with a white spot at each extremity.

A short time before its pupation, the color of the larva changes to a dull rose throughout, with the white lateral and subdorsal bordering bands of a clearer rose. Previous to this change of color, I have observed the caterpillar to pass with its mouth, over the entire surface of its body, even to the tip of its horn, covering it with a coating of apparently glutinous matter—the operation lasting about two hours.

The larva, which occurs on the Grape, is very liable to be stung by its parasite,—perhaps nine-tenths of those which I have taken, having been thus destroyed. It is usually after the last molting, while to all appearance the larva is uninjured and thriving, that numerous little heads may be seen, forcing their way through the skin of its back and sides. Within an hour's time, the entire brood of grubs has emerged. With their terminal segment remaining in the opening made by the escape of their bodies, they at once commence building about themselves, small, firm, snow-white cocoons, which standing on end, are usually so abundant as to cover the entire body; in a couple of hours, they are wholly inclosed. In about a week, the parasite—a small Hymenopterous insect—is developed, escaping from the cocoon by pushing open a nicely fitting lid.

The more fortunate larva, having safely reached maturity, spins loosely together a few leaves, on the surface of the ground, or on the bottom of its breeding cage, and changes to a pupa in three days.

The *Pupa* is 1 in. to 1.20 long, .35 in. broad, cylindro-conical, light brown. Head-case rounded, depressed, with black dots, and a black crescent on the eye-case. Wing-cases lighter brown, with roundish black spots irregularly spaced, on the nervures, and a cluster near the base. Tongue and leg cases also dotted with black. Segments dark brown at the incisures, covered with numerous small indentations, some of which are black—those of the last two segments more conspicuous. First stigma, with a black spot posterior to it,—the other stigmata surrounded with black. Terminal spine, .10 in. long, curved, smooth, shining black, minutely bifid. 2 ♂, 2 ♀.

Imago: appears from the middle of June to August. In a warm room, and in a favorable position, I have had it emerge as early as December 4th. It varies much in size, and in depth of coloring.

CERATOMIA QUADRICORNIS Harris.

In Vol. I. *Proceed. Ent. Soc.* p. 292, I have given a description of the pupa of this species, which is not sufficiently minute, to serve the purpose of positive identification. The possession of a number of the pupæ, affords me the means of a more thorough description, and I accordingly withdraw the former, and offer instead, the following:

Pupa. 1.55 in. to 1.90 in. long, .50 in. broad. Head-case small, depressed, projecting but slightly beyond the anterior margin of the first segment. Eye-case, margined inferiorly by an impressed line.

Tongue-case buried, extending nearly to the tips of the wing-cases. Antennæ-cases prominent, granulated,—their tips in the ♂, nearer to the tips of the middle leg-cases than to those of the anterior ones; in the ♀, extending a little beyond the tips of the anterior. First segment, wrinkled, with a moderately elevated, glossy medial line—its stigma, broadly open, semi-oval. Second segment, wrinkled, projecting at the base of the wing-cases, with a glossy medial line upon its anterior and central portion. Third segment with a nearly central transverse plait, bisected by a dorsal carination, which is broader posteriorly, acute anteriorly, and not extending to either margin: these last two segments depressed posterior to the bases of the wing-cases. The abdominal segments with confluent punctulations—with delicate transverse wrinkles on their posterior portion, and a line of dorsal granulations of about four to the segment, each on a prominent wrinkle, which becomes obsolete laterally. Stigmata ochraceous, except the first and the last, which are brown. Terminal spine of moderate length, constricted at the base, quite rugose, and minutely bifid. 10 ♂, 8 ♀.

SMERINTHUS EXCÆCATUS Sm. and Ab.

Larva. Head apple-green, granulated, flattened, triangular, the apex rising somewhat above the first segment, with bright yellow, straight, lateral lines, in which are rounded granulations, increasing in size as they approach the apex. Body, with thoracic segments tapering, light green, studded with pointed white granulations. Lateral bands, yellow, each occupying three-eighths, the whole, and six-eighths of three segments respectively—on the central segment straight, on the following one, curved posteriorly, not angulated at the incisure,—having within them a granulation on each annulation (eight to the segment) larger than those elsewhere on the body. Subdorsal thoracic line, yellow, granulated as in the bands, commencing on the anterior of the first segment, diverging from the dorsum as it proceeds, and uniting at the sixth annulation of the fourth segment, with the first lateral band. Caudal horn, nearly straight, .25 in. long, acutely granulated, rose-colored, yellow laterally and often yellow tipped. Legs at tips, reddish-brown. Stigmata, brown bordered.

I have taken the mature larva, from the middle of August to the last of September, feeding on the apple and plum. It has also been found on the elm, by W. H. Edwards, Esq.

Pupa. 1.20 in. long, .40 in. broad. Dark brown. Head-case, darker brown, rounded, corrugated, with an impressed transverse line bordering it posteriorly, and a medial line impressed inferiorly and carinated superiorly. Tongue-case buried, short, not separating the leg and wing-cases. Antennæ-cases in ♂, terminating very near to tips of the middle leg-cases—in ♀, opp. tips of the anterior leg-cases. First stigma, quite open. The three anterior segments, shagreened, with a moderately elevated medial line. Third segment without plaits, but with a medial carination. The other segments each with a subdorsal linear impression and also lateral ones,—and with confluent punctulations, except posteriorly, where they are smooth, not shining, and under a lens, delicately shagreened. Terminal segment sub-rectangular, with a short, triangular, rugose spine, more prominent in the ♂. 1 ♂, 2 ♀.

SMERINTHUS ———?

Larva. length 2.5 in., breadth .40 in., tapering anteriorly from the caudal horn. Head green, granulated, semi-conical, not rising above the first segment, the lateral lines, whitish or light green, bordered by darker green posteriorly, commencing anterior to the ocelli, curving slightly, and uniting at the apex—the granulations within these lines larger than those without; maxillæ, within black; labrum, rose-color. Body, apple-green, very pale dorsally, and deeper below the stigmata, with numerous small white-tipped granulations, which are more conspicuous on the anterior segments. The seven lateral bands, pale yellow,—in the first six segments, commencing at the margin of each somewhat below the lower portion of the stigma, traversing two segments in lines slightly concave anteriorly, forming an angle at the incisure—sometimes continued on a third segment, nearly reaching the vascular line,—the granulations in these bands larger than those of the body generally; the seventh band broader, brighter yellow, and more conspicuous from its granulations being elongated into papillæ—commencing on the posterior portion of the ninth segment on the sub-stigmatal flexure, and continued in nearly a straight line, to the horn. The subdorsal thoracic line, pale yellow, extending over the second and third segments nearly horizontally, and on the fourth, curving upward and terminating near the vascular line. Caudal horn, green, straight. broad at its base, .10 in. long. Caudal shield, light green, studded with conspicuous white granulations. Legs, rose-color.

Taken in September, on the Maple. I have not been able to obtain the *Imago* from the above, but from its close resemblance to the *excæcatus* larva, it is probably that of *geminatus*, which is not confined to the *willow*, upon which it usually feeds,—having been taken also on the *white ash* by W. H. Edwards, Esq.

I have succeeded but rarely, in carrying the Smerinthus larvæ through their transformations, perhaps in consequence of an unnatural pupation, to which most of those that I have attempted to rear have been subjected. Placed in a box, on carefully prepared earth, they readily bury themselves in it, but speedily emerge,—again enter the ground,—again emerge,—and continue thus to repeat the operation. until their approaching change unfits them for its continuance, when they are compelled to transform on the surface of the ground. If subsequently buried, my experience has been, that the pupæ seldom survive the winter, but if wintered in subterranean cells constructed by the larvæ, they are usually alive the following spring. It has recently been suggested to me, that there may not have been sufficient depth of earth furnished the larvæ,—my boxes permitting them only to penetrate about four inches.

I am indebted to W. H. Edwards, Esq., for a statement of his method of treating Sphinx pupæ, and as he has found it remarkably successful —rarely loosing a pupa which survives its transformation a couple of weeks—even of Smerinthus,—with his permission, I make it public, believing it to be preferable to any published method, and a desideratum to those who are pursuing the study of insects in its most agreeable and instructive manner—*ab ovo.*

When the larvæ, which bury in the ground for their transformation by well known indications, are in readiness for pupation, they are placed in a box, containing six inches of earth mixed with rotten dust from an old apple tree, or if that cannot conveniently be obtained, with hard-wood saw-dust. The apple-tree dust should be previously baked, in order to kill the eggs or larvæ of such insects or centipedes which might otherwise destroy the pupæ.

If the larvæ are not known to the collector, they should be placed in separate boxes, or at least, compartments, that they and their pupæ may be identified after the change.

The last of October, transfer the pupæ to their winter quarters, taking them from the ground, and placing them in flower pots, containing ground as above prepared, and fine sand centrally, in which the pupæ are to be embedded, properly marking the contents of each. Prepare a box of suitable size, with holes in the bottom for drainage, and a wire cover, to exclude mice and other depredators. In the bottom of the box put a few inches of coarse gravel, covered by a layer of earth, upon which place the pots, and fill to the top with earth and dry leaves. Bury the box six inches under ground, and over it, cover with boards, to prevent water from entering the box.

Early in May, remove them from their winter quarters to some soft earth, arranging them so that the imago, when it emerges, may be referred to its pupa. Upon the earth lay a covering of wet moss, which, by removing and saturating about once a week with water, will furnish the necessary degree of moisture to the ground beneath. An excellent location is an open verandah, out of the direct rays of the sun.

SMERINTHUS JUGLANDIS Sm. and Ab.

Larva. 2. in. long, .22 in. broad at the eighth segment, .14 in. at the first. Head large, longest diameter, twice that of the first segment, apex quite pointed, color light green, with white lateral granulations. Body elongated, slender, tapering gradually from the seventh segment to the extremities, light apple green, granulated regularly on the annulations with white. Lateral bands, seven, lighter green, approaching white, and made the more conspicuous from the increased size of the granulations toward the broadest part of the band, each annulation adding to it a single granulation; extending over two segments and nearly reaching to the vascular line. Caudal horn slender, .20 in. long, quite rough with numerous acute granulations, which are more prominent than those of the body.

Feeds on the Iron Wood (*Ostrya Virginica*) on which it was taken full grown, Sept. 5th. It also occurs on the Black Walnut (*Juglans nigra*) and on the Hickory (*Carya alba*).

Pupa, Male. 1.20 in. long, .40 in. broad. Dark brown, almost black, nearly plane ventrally,—abruptly rounded anteriorly, and gradually posteriorly. Head-case with two conical, granulated, divergent projections between the bases of the antennæ-cases, and two pairs of smaller ones between the eye-cases,—and a pair on the anterior leg-cases. Eye-cases with a tuberculated ridge. Antennæ-cases quite prominent, with a granulation on each joint. Tongue-case buried and not visible, the leg and wing-cases meeting at their tips. Stigmata, except the first, which is nearly closed, quite oval. The seventh, eighth and ninth segments with deep incisures, angulated posteriorly, acutely granulated. and encircled on their posterior margin with a row of spines, sub-obsolete inferiorly and superiorly. The tenth, eleventh and twelfth segments contracted laterally and flattened inferiorly,—the eleventh segment spined on the carination. The terminal segment ending in a broad, flat, rugose, truncate projection. 1 ♂.

ELLEMA HARRISII Clemens.

Larva. 2 in. long, .23 in. broad. Sub-cylindrical, tapering slightly anteriorly, and the last two segments quite tapering. Head, size of first segment, granulated, flattened anteriorly, sub-triangular, with an impressed medial line, and straight yellow lateral lines terminating at the apex in two black granulations, and bordered interiorly above with black. Body grass-green. Subdorsal and lateral bands yellow. Substigmatal stripe bordering the stigmata, white, enlarged on the central portions of the segments. Between the subdorsal and substigmatal stripes,—on the fourth and fifth segments ventrally,—and exteriorly to the legs and prolegs, dotted on the annulations with paler green or yellow. On the vascular line, a series of crimson spots on the anterior of the segment, commencing usually on the fourth,—the first small, sometimes double—the anterior ones triangular or lozenge-shaped, regularly increasing in size and extending over more of the segment—the posterior ones quadrangular, and uniting on the last two segments in a stripe. A ventral stripe of rose-color, commencing at the third pair of legs, widening as it proceeds, and embracing the prolegs. No caudal horn. Caudal shield granulated, and edged with white. Stigmata oval.

I have usually taken the larva about the middle of September, beneath, or ascending the trunks of the White Pine, (*Pinus strobus*) from the leaves of which it seems liable, when near its maturity, to be shaken by high winds.

The *Pupa* is chesnut brown, with a rough, not produced head-case.

Tongue-case buried, parting the leg-cases, but terminating just before reaching the tips of the wing-cases. Incisures rounded. Posterior segments tapering. Stigmata black. Terminal spine black, contracted at base, minutely bifid. Length, .95 in.—1.10 in. Breadth, .30 in.

It has been a very difficult species to rear—by far the larger number dying in the pupa state. From perhaps twenty-five larvæ, I have obtained but four of the perfect insect.

The *Imago* appears the middle of June, at which time I have taken it, resting on the trunks of the Pine, in the grove, where only I have met with it and the larva.

Several years since, in the latter part of August, I found, feeding on the black poplar (*Populus nigra*), two young Sphinx larvæ, of which I made the following record:

Length 1.25 in.; color bluish-slate, of about the shade of the branches of the poplar. Head larger than the anterior segments, and more blue than the body. Body gradually increasing in size to the tenth segment; the eleventh segment elevated in a hump, bearing the caudal horn, which is black, and one-tenth of an inch in length. Caudal shield violet, bordered with red. Legs and prolegs red, the latter with a black spot exteriorly. . Stigmata broadly oval, black, annulated with white. The body beneath yellowish-green.

Unfortunately, both of the above had been injured by parasites, several black spots being visible on their bodies, where the grubs had entered, after escaping from the eggs which had been deposited on their surface,—the shells of several of which still remained.* Died a few days after they were taken.

The shape of the larva would indicate a Smerinthus, but it was without the characteristic granulations of that genus. The notes do not mention lateral bands, and from my imperfect recollection of it, it was neither marked with the bands or with longitudinal stripes.

I record the above, in the hope that the larva may be successfully sought for on the poplar, identified, and the foregoing description of the young larva associated with that of the adult.

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*I have, in several instances, saved the lives of rare Sphinx larvæ, by destroying with the point of a knife or needle the parasitic eggs deposited on the skin, appearing as small, flattened, oval, white spots. If not found before the grubs have left the egg, and entered the body, the death of the larva or pupa invariably follows.

A large number of our Sphinx larvæ are still wholly undescribed; several are given in such general terms as to be of little value in identification; and of our southern species, the descriptions of Smith and Abbot, from some cause—perhaps from having been generally taken from exaggerated colored figures,—are very unreliable. Of the thirty-five species occurring in the State of New York, are the following, of which it is believed no published descriptions have been given:

Nessus,
Inscripta,
Versicolor,
Sordida,
Plebeia,
Luscitiosa,
Jasminearum,
Repentinus,
Modesta,
Geminatus?
Astylus,
Brontes.

Of at least several of the above, there have been opportunities to secure descriptions, and even to give to science complete biographies of a few from the egg to the imago. In consideration of the growing interest manifested among us, in Entomological studies, and of the special interest attached to the Sphinges, I would make an appeal to each Lepidopterist whom these pages may reach, to improve every opportunity presented him, of describing as minutely as possible such Sphinx larvæ and pupæ as are at the present unknown,—comparing the known ones with published descriptions, to note variations, supply additions, or correct errors,—and to contribute the result of his labors to this, or some other Scientific Journal.

I trust that it may not be improper, in this connection, to make mention of a fact already known to many, that to the zeal and liberality of Messrs. J. W. Weidemeyer of New York, Stephen Calverley of Brooklyn, and W. H. Edwards of Newburgh, N. Y., the scientific community is soon to be indebted for a volume in quarto, of North American Sphinges, embracing a representation of every known species. Nearly all the Plates are already executed, and the completion of the work is only delayed until a few Southern species can be procured for figuring, to which access cannot now be had. An inspection of the Plates issued show them to possess a remarkable degree of fidelity and general excellence, alike creditable to the skill of the artist, and to those under whose direction the result has been attained. As the publication of the work is purely a "labor of love," a few copies only are to be issued. and those intended solely for private distribution and foreign exchange.

Could the material for the purpose have been obtained, the above volume would also have embraced figures of the larvæ and pupæ of each species, thereby rendering it complete, and greatly enhancing its value. But before our Sphingidæ can be thus fully represented, much work remains to be done. With a view to its speedy accomplishment, it is very desirable that each collector should carefully preserve such pupæ as do not develop, and of the more rare species, even the pupa-case, from which the imago has emerged, which frequently admits of such repair as to retain all its original features. Collections of the larvæ in alcohol should be made which will prove most useful in description, and for the purpose of figuring; and wherever the skill is possessed or can be commanded, let colored drawings of the larva also be secured.

A reasonable degree of effort, in the direction above suggested, on the part of each Lepidopterist at present enrolled as a member of the Entomological Society of Philadelphia, will very soon place us in the possession of all that is needed for a full history and representation of the interesting and attractive family of the Sphingidæ,—richly deserving of all the labor which its perfect delineation would require.

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Descriptions of two new species of MASARIS.

BY E. T. CRESSON.

In a large collection of Hymenoptera, collected by Mr. James Ridings during the summer of 1864, in the mountain region of Colorado Territory, I find numerous specimens of two undescribed species of *Masaris*. as well as of *M. vespoides*, previously described in these Proceedings. The latter species, the only member of the genus heretofore known in America, was first obtained in Colorado Territory, and from the fact that at the time the description was published, I had only three (1 ♂, 2 ♀) specimens, I was not aware of the many variations, which I have since discovered, in this species. I propose, therefore, in this paper, to give the descriptions of the two new species, and also to notice the variations in the species already described.

A list of the remaining species of Hymenoptera, composing the very interesting collection made by Mr. Ridings, will be given in a paper now in course of preparation, in which the numerous new species will be described.

For the specimens used in the preparation of this paper, the Entomological Society is indebted to the kind liberality of Dr. Thomas B. Wilson.

Genus **MASARIS**, Fabr.

Masaris vespoides, Cresson.

Masaris vespoides, Cresson, Proc. Ent. Soc. Phil. ii. p. 69; pl. 4. (1863.)

The males vary little in their markings from the specimen first described. The transverse line between the insertion of the antennæ varies somewhat in shape, and sometimes, instead of being dilated in the middle as in the type, it is dilated at each end. The anterior margin of the prothorax varies in width, and is more or less indented on each side posteriorly; the spot on the pleura, just beneath the anterior wing, is sometimes wanting; the spot on the tip of the scutellum is sometimes much enlarged and somewhat cordate or lunate, and sometimes it is entirely obliterated; the acute posterior angles of the metathorax are sometimes entirely yellow, sometimes merely margined with yellow. The bands on the abdomen above vary as follows:—that on the second segment is sometimes continuous, with a deep, square emargination on each side anteriorly; the bands on the remaining segments are always continuous, those on the third and fourth segments are more or less deeply and squarely indented on each side anteriorly; the bands on the fifth and sixth segments are always very broad, that on the fifth having a transverse black spot on each side, sometimes there is a deep emargination on each side anteriorly, the band on the sixth segment has sometimes a narrow black line on each side nearly confluent with the posterior margin; the last segment, in one specimen, is merely tipped with yellow, while in all the other specimens it is at least one-half yellow, as in the type.

The females vary considerably, especially in the markings of the abdomen, the bands being sometimes very broad, sometimes narrow, and in two specimens resembling those of the ♂; the band on the first segment is rarely continuous, mostly more or less interrupted on the disk and sometimes slightly, sometimes deeply emarginate or indented on each side of the anterior middle, sometimes the band, although interrupted in the middle, is broad, not indented, but has a small black spot on each side of the interruption; the band on the second segment is sometimes interrupted by the emargination on each side cutting through, as in the typical ♂ specimen, sometimes there is an oblique indentation on each side of the middle anteriorly; the other bands are similar to those in the typical specimens; the two spots on the apical segment vary much in size, they are mostly large and sometimes confluent and forming a broad band, more or less contracted in the middle; the ventral segments have the bands sometimes continuous, but generally more or less indented and often interrupted into spots, the apical segment has sometimes two large unequal spots, occasionally confluent. The transverse yellow line at the base of the clypeus varies much in size, being sometimes quite large, sometimes interrupted and reduced to two small dots and sometimes entirely obsolete. The anterior yellow margin of the prothorax is sometimes slightly interrupted on each side of the middle, more or less broad, and sometimes acutely produced posteriorly on each side of the mesothorax, and in one specimen the prothorax is divided on each side from the mesothorax by a narrow yellow line extending to the tegulæ, and in another specimen there are two elongate approximate yellow spots or lines on the disk of the posterior part of the mesothorax. The scutellum generally has a small bilobed spot at tip, but in some specimens this spot is very large and sublunate, in others there is a mere transverse line, while in others it is entirely obliterated. The spot on the pleura, just beneath the anterior wing, varies much in size, being in some specimens very large, in others reduced to a mere dot, and occasionally wanting.

The specimens do not vary much in size from the typical specimens, except one ♂, which is about one-third less than the other males.

This handsome species was collected by Mr. Ridings in the month of August, on a plant allied to the genus *Lobelia*, growing abundantly on the roadsides in the vicinity of Empire City, Colorado Territory.

Thirty-eight ♀ and four ♂ specimens examined. (Coll. Ent. Soc. Philad.)

Masaris zonalis, n. sp.

Female.—Opaque black; head and thorax clothed with short black pubescence, more dense on the vertex; the orbits, more or less narrow and sometimes slightly interrupted at the summit and beneath, two approximate spots between the antennæ, sometimes confluent and forming a transverse mark, an elongate, more or less developed mark on the disk of the clypeus, sometimes reduced to a mere line or dot and sometimes entirely wanting, and the mandibles, lemon-yellow; clypeus large and prominent, deeply emarginate at tip; antennæ short, about as long as the width of the head, shaped and proportioned as in *vespoides* ♀, first joint above, and the third, yellow, the first joint beneath and the second entirely, black, remaining joints pale ferruginous, except the club above, which is more or less black, sometimes the antennæ, except the first and third joints, are almost entirely blackish above. Thorax: broad anterior margin of the prothorax, its entire posterior margin extending to the tegulæ, a large spot on each side of the pleura, the tegulæ, a transverse, sublunate, more or less developed mark on the scutellum, sometimes a transverse line behind the tegulæ, and a spot on each side of the metathorax covering the acute spiniform posterior angles, all lemon-yellow. Wings more or less deeply tinged with yellowish-fuscous, the broad apical margins paler, the tip of the marginal cell more or less fuliginous; nervures yellowish-ferruginous. Legs lemon-yellow; the coxæ, trochanters and the basal two-thirds of the femora, black; sometimes the coxæ are slightly yellowish at tips; the tibiæ beneath and the tips of the tarsi more or less tinged with pale ferruginous; anterior tarsi pubescent, with the basal joint dilated; the shortest spur of the posterior tibiæ suddenly tapering to the tip and acutely cleft, the short prong very slender and somewhat hooked at tip. Abdomen slightly sericeous; all the segments above, except the last, with a continuous, more or less broad, lemon-yellow band on the apical margin, that on the basal segment slightly undulate or dentate anteriorly, sometimes those on the fourth and fifth segments are more or less deeply and squarely emarginate on each side anteriorly, and occasionally the bands on the second and third segments are slightly emarginate on each side anteriorly; terminal segment mostly with a rounded lemon-yellow spot on each side, sometimes confluent and forming a broad band; beneath, the second, third and fourth segments have each a lemon-yellow band, sometimes interrupted into small unequal spots, and sometimes subobsolete. The general structure like that of *vespoides* ♀, but the form is less robust. Length 5—6 lines; expanse of wings 9—9½ lines.

Male.—Black, slightly pubescent, somewhat shining; head with the orbits, continued within and beneath the sinus of the eyes, a large subquadrate spot beneath the insertion of the antennæ, the clypeus, labrum and the mandibles, pale yellowish-white; clypeus shaped like that of *vespoides* ♂, but more flattened and less deeply emarginate at tip; labrum pubescent; antennæ rather longer than the head and thorax, proportioned as in *vespoides* ♂, except that the club is not at all flattened beneath; the joints are pale yellowish-white above or rather exteriorly, the two basal joints are more or less black above at base, the fourth, fifth and sixth joints at tip beneath, and the whole of the remaining joints beneath are pale fulvous, the club above at tip, more or less black, the five articulations of the club are closely soldered together, the sutures indistinct. Thorax: the markings and coloration same as in the ♀. Wings as in *vespoides* ♂. Legs colored as in the ♀, and shaped as in *vespoides* ♂, except that the anterior tarsi are scarcely ciliated and the basal joint of the posterior tarsi is scarcely as long as the four remaining joints together; the spurs of the posterior tibiæ are about equal in length, the outer one slender and very acute, the inner one stout, acute and suddenly acuminate and bent at tip, but not cleft as in the ♀; the tarsal claws are simple, thickened at base, the pulvilli small and blackish. Abdomen shaped like that of *vespoides* ♂; shining black; all the segments except the terminal one, with a continuous pale lemon-yellow band; those on the five basal segments more or less emarginate on each side anteriorly; the band on the sixth segment entire, except occasionally a slight notch on the anterior middle; apical segment black, polished, deeply bifid or forked at tip when viewed from above, when viewed in profile the tip is rather broad and obtusely emarginate, the lower process being the shortest and stoutest, when viewed endways the tip has a subtriangular shape, concave, more or less lemon-yellow, with the lower process rather deeply emarginate; venter flattened, shining black, most of the segments with a lateral yellowish spot; the second segment with a more or less developed fold anteriorly, obtusely emarginate on the middle; on the disk of the third segment there is a large, robust, well-developed process, obtuse at tip, but with a short, stout, subacute spine posteriorly, similar to that of *vespoides*

♂ . but less developed. Length 5 lines; expanse of wings 9 lines.

Hab.—Rocky Mountains, Colorado Territory. 3 ♂ , 65 ♀ specimens. (Coll. Ent. Soc. Philad.)

This pretty little species is closely allied to *M. vespoides*, the ♂ being almost an exact miniature of the ♂ of that species; but the ♀ differs much in the markings; those of the abdomen above being always continuous, and never interrupted, although often more or less emarginate anteriorly, but never so deeply as to interrupt the bands; the general form is much less robust in proportion to the size, than in *vespoides* ♀ . The ♂ differs from that of *vespoides* in several points of structure, viz. the club of the antennæ is rounded and not flattened beneath, the basal joint of the posterior tarsi is scarcely as long as the remaining joints, while in *vespoides* ♂ it is almost twice as long as the remaining joints; the apical segment of the abdomen differs much from *vespoides* ♂ , in having no carinæ on the disk, and in the tip being much more deeply bifid, both above and beneath, and the projection on the third ventral segment is more robust, and not compressed nor emarginate at tip as in *vespoides* ♂ .

Mr. Ridings found this species in August, on a plant apparently belonging to the genus *Phacelia*, growing in the vicinity of Empire City. The ♀ ♀ were abundant, but the ♂ ♂ extremely rare.

Masaris marginalis, n. sp.

Female.—Deep opaque black, robust; head and thorax clothed with short erect black pubescence, very finely and densely punctured; orbits of the eyes behind and on the upper part of the sinus in front, and a transverse line or two spots between the insertion of the antennæ, sometimes interrupted so as to form a row of three or four spots, and sometimes two spots with a minute spot above them, white; clypeus large, rather convex, slightly and obtusely emarginate at tip; labrum pubescent, and sometimes tinged with piceous; mandibles dull ferruginous at tip, as well as the palpi more or less; antennæ shaped and colored as in the preceding species. Thorax robust; anterior margin of the prothorax and its posterior margin, extending sometimes entirely to the tegulæ, sometimes interrupted and often abbreviated before reaching half way to the tegulæ, white; the anterior lateral white margin of the prothorax is more or less developed, being sometimes reduced to a mere line or spot, sometimes broad and entire and confluent with the posterior margin in front of the mesothorax; pleura, scutellum and metathorax immaculate, the scutellum has occasionally two minute white spots, sometimes confluent, at tip; posterior face of the metathorax flattened, the posterior angles obtuse and scarcely developed; tegulæ black, with its outer half white. Wings more or less stained with yellowish-fuscous, in one specimen rather strongly tinged with fuliginous and the tip of the marginal cell darker; nervures yellowish-ferruginous. Legs black, shaped as in *zonalis* ♀; the extreme tips of the coxæ and femora sometimes whitish; tibiæ pale yellowish, with a fusco-ferruginous stain on the apical half beneath; tarsi pale ferruginous. Abdomen robust, deep black, with a slight gloss; all the segments above, except the terminal one, with a more or less narrow white band on the apical margin, sometimes entire, sometimes slightly interrupted on the middle, sometimes finely serrated anteriorly and often more or less emarginate on each side anteriorly, especially those on the fourth and fifth segments; apical segment entirely black, broadly rounded at tip; beneath deep black, immaculate. A single specimen varies in the clypeus having a short, longitudinal white line on the disk, a minute white dot on the pleura immediately beneath the anterior wing, a minute white dot on each side of the apical segment of the abdomen above, and the third segment beneath has a row of four white dots on the apical margin. Length 5—6 lines; expanse of wings 9—10 lines.

Hab.—Rocky Mountains, Colorado Territory. 18 ♀ specimens; ♂ unknown.

This species is distinguished at once from *M. zonalis* by its much more robust form, and the nearly pure white markings. It was collected by Mr. Ridings on the same plant and in the same locality that he found *M. zonalis*. He was unable to discover the ♂ after a long and diligent search.

Descriptions of several new species of CYNIPS, and a new species of DIASTROPHUS.

BY H. F. BASSETT.

QUERCUS RUBRA. *A cluster of forty or fifty elongate-ovate galls on a branch of a young red oak tree. They are from three-fourths of an inch to an inch in length, and a half an inch in diameter in the middle, tapering to a point at the ends; covered with a short, velvety pubescence, and when dry, ridged like a melon; the inside, a cork-like substance adhering closely to the larval cell, and divided lengthwise into many parts like the dissepiments of the seed-vessels of various kinds of plants; monothalamous—the cell one-tenth of an inch long.*

C. q. formosa n. sp.

♀. Head black. Head and face finely and evenly rugose. *Antennæ* 15-*jointed,* yellowish-red, the terminal joints darker. The suture between the 14th and 15th as distinct as the preceding ones; face with a short pubescence, the hairs converging towards the mouth; mandibles black, palpi yellowish-red. *Thorax* black; a few short hairs on the collare; *mesothorax:* parapsidal grooves distinctly marked, median line broad where it begins on the scutellum, but gradually decreases and disappears just before reaching the collare; between this and the parapsidal grooves two short lines beginning on the collar and extending half way to the scutellum. The thorax and pleuræ are beautifully *ripple-marked with fine short transverse lines.* This style of marking is distinct from that of any of the species in my collection—thirty or more. The same style, only coarser, is seen in some Chalcidians. *Scutellum* small, finely rugose, the small foveæ are smooth and shining. Legs bright brownish-red, except the upper part of the femur, which is nearly black, and the black coxæ. *Abdomen* bright reddish-brown, with an extremely minute microscopic punctation; sheath of the ovipositor a dark brownish-red. *Wings* hyaline, also the veins, except the first and second transverse and the subcostal, which are a very pale yellow; areolet large, equiangular, bounded on the inner side by entirely colorless veins, radial area open. Length .12. ♂ unknown.

The flies have not yet left the gall (Nov. 25) though they have been in the imago state for several weeks, and crawled about actively when the galls were opened. They may be imprisoned by the hard dry gall, but I am inclined to think, that, like some other species, they remain in the galls in the perfect state through the winter and come out early in the spring.

The galls of this species are very rare. I have found only two clusters, and one of these was much eaten by some Lepidopterous larva, and the larvæ of the true gall fly were destroyed. Only a part of the galls in the other cluster were developed as described above; the smallest were not larger than grains of barley, but contained larvæ, and have produced true gall flies. Their diminutive size was owing, apparently, to their being closely crowded.

This and the species next described, *C. q. ventricosa* n. sp., are readily distinguished from any other American species yet described, by the female, (male as yet unknown,) having *fifteen distinct antennal joints.* Dr. Fitch (N. Y. Rep. Vol. 2. No. 309) speaks of having, in his collection, a female gall fly with fifteen jointed antennæ, but he does not describe it, nor the gall from which it came.

Westwood (Syn. Gen. Br. Insects) does not characterize any genus of the family Cynipidæ as having more than the ♀ 14, and the ♂ 15 antennal joints—but the ♂ of my *C. q. singularis** (Proc. Ent. Soc. Phila. Vol. 2nd. p. 326) has 16-jointed antennæ, and *C. q. scitula*—a new species described in this paper—also has the same number. The females of both these species have only 13 joints, the terminal one long and connately divided in the middle.

C. q. formosa and the species next described are evidently closely related, for besides the 15-jointed antennæ of the ♀ there are other points of resemblance; and the remarkable difference in the colors of the two species, the ripple-marked thorax of *C. q. formosa*, and the widely different galls from different species of oak, are the most marked specific characters. The shape of the abdomen of both species is peculiar; different in form, and, I think, in structure, from any other species I am acquainted with, but I have not yet sufficiently studied the structure to describe it well, and have simply, in my description, noticed the vertical diameter as equalling or exceeding the length.

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* Mr. Walsh assures me that my C. q. singularis is the same as C. q. nubilipennis Harris. He is undoubtedly correct, and my name stands, of course, as a Synonym. Dr. Harris' very brief descriptions were definite enough, perhaps, when the number of species was, as when he wrote, very small, but hardly complete enough for the genus to-day. The number of species described and properly belonging to, or provisionally placed in, the genus Cynips, exceeds fifty, and many more will probably be found.

QUERCUS ILICIFOLIA. *Galls growing in clusters from three or four to a dozen together, on the limbs and occasionally on the trunks of young shrub oaks. They are cone-shaped, truncate at the base, the apex often prolonged in a slender, recurved point. They are from four to five-eighths of an inch long, and from one-fourth to three-eighths in diameter at the base. When green, often of a deep red color; when dry, brown or black; very hard, enclosing a nearly free larval cell like that of C. q. globulus, Fitch.*

C. q. ventricosa n. sp.

♀. Head and thorax a bright cinnamon color, head finely punctate, face pubescent, dark brown around the mouth, tips of the mandibles black, palpi pale brown. *Antennæ* long, 15-jointed, third joint longest, others gradually decreasing in length to the 15th, which is as long as the two preceding ones, and shows plainly a connate suture. *Thorax* finely and evenly punctate; parapsidal grooves not deep; the line dividing the mesothorax lengthwise reaches from the collare to the scutellum; each side of this is a line reaching half way from the collare to the scutellum, and marked with an indentation at the posterior end; also a deep linear depression on each side over the base of the wings; pleura microscopically punctate; mesothorax bounded on the sides and where it joins the scutellum by a dark reddish-brown line. *Scutellum* very finely sculptured, a dark and narrow ridge dividing it half the length. Feet yellow, tips of the tarsi black. *Wings* hyaline; the subcostal, anal, first and second transverse veins large, dark reddish-brown; the first two rather paler towards the base; areolet distinct; radial area open, the vein forming its base considerably enlarged. *Abdomen* darker brown than the thorax; segments short, second longest; vertical diameter, i. e. the distance from the back of the abdomen to the ventral edge, equals or slightly exceeds the length; terminal segments show a fine punctation. Length .14. Male unknown.

My galls were collected in June. The flies were found to be fully developed in October. They were cut out, else they would probably have remained in the galls until spring.

QUERCUS ILICIFOLIA. *Elongated, fusiform galls growing on the upper side of the leaves of Q. ilicifolia, and standing erect, or nearly so—sometimes entirely preventing the development of the leaf, and apparently growing out of the petiole. The central nucleus containing the larvæ is kept in place by radiating woody fibres as in C. q. inanis O. S. The largest galls are two inches in length and seven-eighths of an inch in diameter; average size about one and three-fourths inches long, and three-fourths in diameter. Apex rather longer and more slender than the basal portion, and often considerably curved.*

These galls are of the same dark green as the leaves. Many are found very much smaller than those described above, but they produce parasitic flies. Baron Osten Sacken writes me that he met with numbers of these galls in Pennsylvania several years ago. They are rather rare here (Conn.)

Q. q. ilicifoliæ n. sp.

♀ Black, vertex of the head, and the entire thorax black, and deeply and irregularly sculptured; face rugose and pubescent; hairs converging toward the mouth; palpi shining reddish brown. *Antennæ* 13-jointed, the 13th long. and with a false suture apparent on the inner side; first and second joints very short, shining black; the remaining ones pubescent, and dull black. *Thorax* with a coarse pubescence. The parapsidal groove obliterated by the coarse, somewhat linearly arranged sculpturing. Foveæ large but sculptured like the rest of the scutellum. *Feet:* coxæ, and the upper part of the femur of the two anterior pairs black—other parts reddish-brown; posterior pair black, reddish at the joints. *Abdomen* black shining, the ventral edge clear brownish red. The segments, except the first and second, with a very fine microscopic punctation, most apparent on the third segment. *Wings* slightly dusky; veins brownish black, heavy; areolet very small, vein at the base of the open radial area covered by a large brownish black cloud, which covers part of the areolet but does not reach the anterior margin of the wing. A very light brown cloud in the basal cell of some specimens. Length .17.

♂.—Antennæ 15-jointed, feet darker than those of the female; posterior pair, including the tarsi, almost entirely black. Otherwise like the female except the usual sexual differences. Length .14.

Ten ♀ and four ♂ specimens.

QUERCUS ALBA. *Flat, green, succulent galls, often of a very irregular outline, and from one-fourth to more than an inch in diameter, the vertical diameter from one-fourth to three-eighths of an inch, growing on the leaves of the white oak, and producing, according to the size, from two or three, to more than a dozen gall-flies.*

The flies escape from the galls in June, through the upper or under surface. The water that enters the cavities the flies have left causes the galls soon to decay and drop off, but a few change to a dry pith-like substance, and remain on the tree through the summer. These might be taken for a different species, as they generally contain larvæ, but having reared a few Spalangia (?) from such galls, I infer they are all parasitic.

This species is closely related to *C. q. irregularis* O. S. but grows on a different species of oak, and Baron Osten Sacken to whom I sent specimens, thinks it may be specifically distinct from that species, which I have not yet seen. The imperfect condition of his only specimen of *C. q. irregularis* renders a satisfactory comparison impossible, and acting upon his suggestion, I describe it as

C. q. majalis n. sp.

♀ *Head* transverse, black, nearly smooth, but under a powerful magnifier presents a fine netted appearance; face smooth with a very few short white hairs; mouth brown, tips of the mandibles black. *Antennæ* long, with 13 joints, first and second short, third very long and enlarged at the upper end. These, except the slightly enlarged portion of the third, are a pale yellowish white, the remaining joints a light opaque brown. *Thorax* black, smooth and shining; without any grooves or striæ whatever on the mesothorax. *Scutellum* smooth, separated from the mesothorax by a broad shallow groove; foveæ wanting; marked posteriorly by *two deep transverse grooves*, causing three transverse ridges above the insertion of the abdominal peduncle. *Feet* white with a tinge of yellow, like the basal joints of the antennæ. *Abdomen* black, smooth; in dry specimens shrunken and wrinkled. *Wings* large with a faint duskiness and a dusky cloud resting on the first transverse vein; veins dull brown; areolet present; radial area open, long and very narrow. Length (dry) .09.

♂.—*Head* black; *antennæ* 15-jointed; three basal joints paler than of the ♀; others a semitranslucent brown. Third joint very long, remaining ones short, and of equal length. Third joint curved rather than incised. *Thorax*, the feet and the first and part of the second segment of the abdomen very light yellowish brown. The central part of the mesothorax dark shining brown; terminal segments of abdomen dark brown; in some specimens nearly black. Length .10, slightly longer than the ♀.

Several hundred ♂ ♂ and ♀ ♀.

QUERCUS TINCTORIA. *Woody, tuber-like galls, growing on the green branches of Q. tinctoria, sometimes simply an enlargement of the limb, at others entirely checking its growth and covered with leaves. They are from three-fourths to an inch and a half in length, and rather more than half an inch in diameter at the base, tapering to a cone-like point.*

C. q. scitula, n. sp.

♀. Black. *Head*, vertex black, subrugose; sides of the head and the face in some specimens a very dark brown, with a shade of red, but most are a dull brownish black; face pubescent. *Antennæ* 13-jointed, the 13th long and in the middle connately divided; the basal joints yellowish-brown, the terminal dark brown, the transition gradual. *Thorax* finely and regularly punctate; parapsidal lines fine, and two parallel interparapsidal lines so faint as to be seen only in certain positions to the light, median line merely a longitudinal depression, a short deep groove over the base of the wings. *Scutellum* regularly and finely sculptured; basal pits obsolete. *Feet* shining yellowish-brown. Middle of the femur and tibia darker than the joints, tarsal tips black. ***Wings*** hyaline, 1st transverse and radial veins dark brown, others pale but distinct; areolet of medium size and at the base of the open radial area. Length .09.

The ♂ closely resembles the ♀ in color and markings. The abdomen is very long, and the antennæ a rich amber color, with a few of the terminal joints of a light brown. In all the specimens I have examined (16) the ***number of antennal joints is sixteen.*** Length .08.

Numerous ♀ ♀ and 25 ♂ ♂.

Dr. Fitch has given a very correct figure and description of the gall of his *C. q. batatus*, which, it will be seen, closely resembles that of the above species. Indeed there is little or no apparent difference in the galls more than pertains to the different species of oak on which they grow, but the flies are very distinct. As Dr. Fitch describes the fly so very briefly that it may easily be confounded with *C. q. scitula*, I give a more full description below:

Quercus alba.

C. q. batatus Fitch. (N. Y. Reports, Vol. 2nd. No. 311.)

♀ Black, shining, entire head black, vertex smooth; face, covered with a fine thin pubescence; color of the palpi, clear vitreous brown. ***Antennæ*** 13-jointed, first three joints pale yellow, others a pale semi-translucent brown. ***Thorax*** black, shining, but under a powerful magnifier shows a net-work of fine lines; parapsidal grooves and striæ obsolete. ***Scutellum*** smooth, polished; a few scattered hairs on the posterior portion; basal pits wanting; separated from the mesothorax by a deep shining groove. ***Abdomen*** black and polished but in all my dry specimens contracted and wrinkled. ***Feet,*** coxæ clear yellowish brown, femur, in the middle dark brown or black, as is also the tibia of the posterior pair; remaining portions, except the tips of the tarsi which are black, are of the same color as the coxæ. ***Wings*** hyaline, all the veins dark brown and of nearly equal size. The cubitus large and heavy its whole length; areolet large; radial area open. Length .09.

♂.—The antennæ of the male is 14-jointed. Feet dull pale yellow. Abdomen petiolate by the elongation of the first segment. Length .08.

Numerous specimens ♂ and ♀.*

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* I am satisfied that there are annually two generations of *C. q. batatus.* The first appears early in May, from galls of the preceding year's growth,—the last late in June, from green galls. I have often found perfect insects in the galls in winter, and have reared flies from them, apparently of the same species reared from the summer galls. Inquilinae in great numbers are produced from the winter galls and few true gall flies, while the reverse is true of the summer form. As many of the summer galls remain green after the flies have left them, and as the tree's annual growth is nearly or quite complete the first of July, it

QUERCUS ILICIFOLIA. *Club-shaped, woody galls, growing on the ends of the small limbs. Apex blunt and generally turned to one side, covered in summer with a few leaves and containing one, and occasionally two or three larvæ. It is strikingly like that of C. q. tuber of Fitch, but produces a fly which though closely related, is evidently a different species.*

C. q. similis n. sp.

♀. Head and thorax a bright brownish red; vertex of the head finely sculptured; the rather prominent ocelli are black only at the apex, face pubescent; hairs short, converging towards the mouth. *Antennæ* 13-jointed, the 13th nearly as long as the two preceding ones and in some individuals there is an obscurely marked connate suture. *Thorax* coarsely punctate, sparsely hairy, a shade darker than the head, three faint longitudinal lines reach from the collare to the scutellum, and two other lines, one on each side and very close to the median line, start from the collare and extend half-way to the scutellum; obscure line over the base of the wings. *Scutellum* sculptured, basal pits small, deep and smooth. The central portion of the pleura—in many species smooth and polished—is in this covered with very fine longitudinal striæ. The legs of a uniform brownish red, except the tips of the tarsi which are black. *Wings,* a subopaque white, the subcostal, anal, 1st and 2nd transverse very pale yellow, others colorless and the *vein which bounds the posterior side of the radial area in other species is, in this obsolete, as is, also, the cubitus and areolet.* *Abdomen,* red, except the dorsal portion of the middle segments which is nearly black; terminal segments withdrawn into the others in dry specimens, and the sheath of the ovipositor turned abruptly upward but does not extend above the back of the abdomen as in the Inquilinæ. Length .12.

♂. Black head and thorax. *Antennæ* 15-jointed, 1st and 2nd joints nearly black, others red. *Legs,* posterior pairs dark reddish-brown, the posterior pair dark brown, nearly black—all lighter at the joints. *Abdomen* black and shining, 2nd segment long. It is much smaller than the female. Length .08.

16 ♀, 4 ♂ specimens.

C. q. tuber Fitch. (N. Y. Rep. Vol. 2nd, No. 309.)

♀.—Head black, sides, however, in a strong light have a tinge of red; face black, pubescent, hairs converging towards the mouth *Antennæ* yellowish-brown, 13-jointed. *Thorax,* a reddish tinge on the shoulder of the collar; other parts black, rather densely pubescent. Three longitudinal lines somewhat obscured by the pubescence; two short lines extend half way from the collare to the scutellum and there is a short faint line over the base of the wings; scutellum rough, hairy; fovæ medium size; smooth spot on the pleura polished, shining, but not perfectly smooth. *Legs* brown, tips of the tarsi black. *Abdomen*

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seems probable the June flies oviposit in the galls from which they were produced.—Jan. 28, 1865.

black shining, second segment longest, separated from the third by a connate suture, third with microscopic punctation. Sheath of the ovipositor not turned up nearly so much as in *C. q. similis*, to which species it is closely related. *Wings* hyaline, sub-costal, first and second transverse veins pale brown, others colorless; lower part of the cubitus obsolete; areolet present; radial area open. Length .12.

Nine specimens.

I have a single male gall fly reared from the same galls, but it differs so much from the female that I am inclined to think it belongs to a different species. The thorax is quite smooth and shining, with a few short, scattering hairs, and only two longitudinal lines that closely converge at the scutellum. The venation of the wings is like that of the female described above, and is unquestionably that of a true gall-fly. The antennæ light dusky brown, 15-jointed; legs dark shining brown, nearly black, paler at the joints.

Though the galls are very much alike, the venation of the wings, the pleuræ, and several other points of difference mark it as a distinct species from *C. q. similis*. Dr. Fitch has figured the gall of his *C. q. tuber* which he found "quite common particularly upon the soft and tender limbs of young (white oak) trees" (*N. Y. Rep.*, Vol. 2d, No. 309). He describes (l. c. No. 310) the galls of *C. q. arbos* as "swellings similar to that above described, growing on the tips of the limbs of aged and large white oak trees."

My galls, which are probably identical with his *C. q. tuber*, were gathered from low, shrubby white oak bushes, though I have often seen precisely similar ones on large trees. Dr. Fitch's descriptions of the flies from *C. q. tuber* or *C. q. arbos* will apply, so far as they go, to either the gall flies, or to the guest flies as the inquilinæ are termed by Mr. Walsh. For the reasons that follow, I am led to think that the species he described under the above names are both inquilinious species.

1st. My galls were gathered about the 20th of June, and were then green and soft like the wood of the young shoots on which they grew. The insects were then in the pupa state, and the imago came out early in July. The gall from which Dr. Fitch's *C. q. arbos* was reared was found in March, and were of the preceding year's growth, as were also those of *C. q. tuber*, if we may judge from his description of the color of the gall, which will only apply to the galls long after the true gall-flies have left them.

2nd. My galls gathered from young white oaks, and which answer perfectly to his figure and description of *C. q. tuber*, produced females with 13-jointed antennæ, while his have but 12 antennal joints.

3rd. I have gathered several hundreds of these galls in the autumn, winter and early spring within the last two or three years, but have never reared from them one true gall-fly, though they have produced large numbers of male and female guest-flies—the male answering perfectly to Dr. Fitch's description of *C. q. arbos.* The female he had not seen.

4th. The galls I collected in June have not yet produced any guest-flies, but cutting open several to-day I found in one a large living larva—the others were empty or contained dead gall-flies that had not been able to eat their way out of the dried gall.

From the above facts I am forced to believe that the galls *C. q. tuber* and *arbos* Fitch are both produced by the same fly, and that it is the same species that I have described above and for which I retain Dr. Fitch's name, *C. q. tuber.* Dr. Fitch has, no doubt, described two distinct flies, for Mr. Walsh, who has devoted much attention to the guest-flies of the oak galls, finds that not only do some species live in several different species of galls, but that the same kind of gall may produce more than one species of guest-fly. (*Proc. Ent. Soc. Philad.* Vol. 2d, p. 465.)

Mr. Walsh, in the article referred to, mentions other of Dr. Fitch's species which he is satisfied are inquilinæ, and not the producers of the galls from which they were reared. (See pp. 464–5, 484 and 494.) His remark that " *C. q. tuber* Fitch is in all probability a guest-fly," escaped my notice till this moment.

QUERCUS MONTANA. *Hard, round galls,* .25 *of an inch in diameter with a finely papillose surface and a solid radiated cellular structure; growing sometimes on the upper, but as often on the under side of the leaf; attached to the larger veins by a very short pedicel.*

These galls are rarely met with, and I have seldom found more than one on a leaf. In a single instance there were three on the same leaf, two on the under side and one on the upper. My specimens were found in October and contained perfect insects. Through the gall of several, gathered October 20th, the insect had eaten a passage but they still remain in the galls.* Each contains a single, subapterous, female gall-fly, closely related to *C. q. forticornis* Walsh, and *C. q. pezomachoides* Osten Sacken. Dr. Fitch's figure and description of the gall of *C. q. pisum*, (*N. Y. Rep.* Vol. 2, No. 319,) answers well for this gall, but his were from a different species of oak, and this gall-fly is very distinct from that he describes. Baron Osten Sacken informs me that these subapterous females have winged males and belong to the genus Andricus.

I let this species stand with the related species named above and call it

C. q. hirta n. sp.

Head black, vertex slightly rugose, densely hairy as is also the entire dorsal portion of the thorax; face pubescent, hairs converging towards the mouth: palpi shining brown, tips black. *Antennæ* long, slender, black, 14-jointed. *Thorax* black, very small, densely covered with a coarse, yellowish-white pubescence. No striæ visible on the mesothorax. They are concealed by the pubescence if they exist. *Feet* a dull brownish black, but in a strong light appear of a very dark reddish brown, posterior pair lightest and all somewhat paler at the joints. *The wings* are mere yellowish white scales. *Abdomen* large, black and shining, a short, close pubescence on each side of the 2nd segment and this and the remaining segments, except the first, bounded across the back and sides on the posterior edge by a belt of long, silvery white hairs. These belts are divided on the dorsal ridge by a shining glabrous line like the anterior portion of the segment. These belts are plainly visible without the aid of a magnifier. Length .14.

Six ♀ specimens.

New species of galls, the flies of which are, as yet, unknown to me.

QUERCUS CHINQUAPIN. *Gall a cone-like body, developed from the axillary leaf-buds, and covered when green and often when dry with a dense, rose-like cluster of imperfectly developed leaves. The cell containing the larva smooth, shining, oval, about one-eighth of an inch long, half immersed in the apex of the cone.*—C. Q. FRONDOSA n. sp. Gall fly unknown.

These singular and very pretty galls are developed after the summer growth of the tree is completed, and the axillary buds are formed. The sting of the insect causes the buds that would otherwise remain undeveloped till the following year, to develop in the autumn in the abnormal manner described above.

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* November 29. A single fly was found in the box yesterday. It is quite active, and does not differ from those cut from the galls, showing those to have been mature.

The rudimentary leaves are green, ligulate, and the more perfectly developed galls resemble, more than anything else I can think of, the flowers of the common Artemesia of the flower garden. They are not common, but I have several times met with them, and the clump of oak bushes from which my specimens were gathered was covered with them. The larvæ are now fully grown. On the same bushes I found a gall like *C. q. globulus* Fitch,—and several dry, brown galls on the petioles of the leaves, apparently those of *C. q. petiolicola*.

Q. RUBRA. *Clusters of seed-like bodies, often thirty or forty together growing on the midvein on the under side of the leaves of Q. rubra. The larger cells are about the size of a grain of wheat. They are smooth, greenish-white, the apex enlarged, and would remind a botanist of the sessile stigma of some flowers.*—C. Q. DECIDUA, n. sp. Gall fly unknown.

My specimens were collected about the first of October, and were then fully grown. Some had fallen to the ground, but on cutting open a large number I could not detect any larvæ. The leaf stems and twigs were placed in water to keep them green, but the galls soon dried and many fell off. A few fell into the water, and these not only kept green, but on opening them a few days since, half-grown larvæ were found. From this I infer that the growth of this species is dependent upon the galls being covered in the earth.

Gen. DIASTROPHUS.

DIASTROPHUS POTENTILLÆ, n. sp. Galls on Potentilla Canadensis. They are from .3 to .5 of an inch in diameter, and rather longer than thick, growing in the axils of the leaves; of a soft spongy consistence when dry, and each contains a single cell in shape and size like the nucleus of *C. q. globulus*, though not, like that, free from the substance in which it is enclosed. They are rather rare here (Conn.), but I saw large numbers of them in the northern part of Berkshire Co., Mass., last summer. The fly came out May 20th from galls of the previous year's growth. It is much like *D. nebulosus* O. S., but Baron Osten Sacken has compared it with this species, and pronounces it distinct.

Male.—Head black; vertex nearly smooth, the face black, finely aciculate, a ridge or carina from the vertex to the mouth, organs of the mouth with faintest possible tinge of reddish-brown. *Antennæ:* 1st, 2nd and 3rd joints black, the remaining ones dark cinnamon. 3rd joint not deeply incised, 14-jointed. *Thorax* black; collare hairy; mesothorax shining; two deep lines from collare converging towards the scutellum; space enclosed nearly smooth and hairless, with very faint longitudinal grooves. *Scutellum* sculptured, the basal pits large and deep. Lateral view of the scutellum shows as a cone, the axis of which is at an angle of 45 deg. from the axis of the body. *Legs* dark brown or black, coxæ black; femur and tibia yellowish brown, on the upper side darker; tips of tarsi black or nearly so; pleura very finely aciculate. *Abdomen* briefly petiolate, shining black, 2nd and 3rd segments connate jointed. *Wings* pale dusky; veins heavy, none of them reaching the margin; vein forming the base of radial area with heavy brown blotch. 1st transverse reddish-brown; areolet small distinct; radial area open. Cubitus disappearing before reaching the first transverse. Length (dry specimen) .11.

Female.—Antennæ 13-jointed, legs a shade darker than the male, otherwise as the male, though as usual larger, .13 long. The ocelli form nearly a straight line on the head. Abdomen in male and female perfectly smooth and shining.

In Mr. Cresson's Catalogue of described N. Am. Hymenoptera, *Diplosis potentillæ*, Harris, occurs, taken from Dr. Harris' Catalogue of Ins. Mass. 2nd ed. I have not seen Dr. Harris' catalogue. Should my insect prove identical with his, I shall have only removed it to Diastrophus, the genus to which, without doubt, it properly belongs.

The following remarks and description were communicated to me by Baron R. Osten Sacken, for publication in this paper:

"In my paper entitled '*Additions and Corrections*,' etc., (*Proc. Entom. Soc.* 1862) I described a gall under the name of *C. q. strobilana* (l. c. p. 254), the producer of which was at that time unknown to me. Many months afterwards, I obtained the fly, by cutting the dry galls open. It belongs to the genus *Cynips* in the restricted sense (agamous according to Hartig), and I let its description follow:

Cynips quercus strobilana O. Sacken.

♀. Antennæ 14-jointed; body dark brown, with a close, appressed pubescence on the thorax and along the hind margins of the abdominal segments; feet brown; anterior knees and tarsi reddish; wings hyaline; length from 0.17—0.22.

Head black, finely punctured and pubescent; palpi reddish; antennæ rather short for the size of the insect, 14-jointed; third joint about as long as the two first, taken together; fourth, fifth and sixth gradually decreasing in length, the seven penultimate joints being nearly as long as broad; the last segment is somewhat longer than the preceding, although not equal in length to the two penultimate joints taken together; it shows no indication of a sub-division. *Thorax* densely clothed above with a yellowish, appressed pubescence, which does not prevent, however, from distinguishing the sculpture; the latter consists of a moderately dense punctation and several rather shallow grooves, two of which, running from the collare backwards, end about the middle of the thorax by a slight, smooth and flat expansion. Pleuræ black, punctured, except a smooth, shining spot in the middle; their lower part is pubescent. *Scutellum* punctured above, rugose behind and finely pubescent; the pits at its base are of moderate size. *Abdomen* pitch-black, in some specimens slightly reddish below and along the hind margin of the segments; its whole surface, except the base of the segments and a narrow, smooth line along the back, is clothed with a whitish, appressed pubescence; under this pubescence a moderately dense punctation is perceptible; the second (largest) segment of the abdomen hardly reaches its middle. The feet are dark brown, pubescent; the base of the femora, the knees and the tarsi of the foremost pair are reddish; in some specimens a reddish tinge appears at the base of the femora and on the knees of the two posterior pairs. *Wings* hyaline; the second transverse vein forms a knee which bears a distinct stump of a vein in the middle.

Seven ♀ specimens."

WATERBURY, CONN., Dec. 1864.

DONATIONS TO CABINET.

APRIL 11, 1861.

27 **Coleoptera** (*Tetracha violacea, T. Lebasii, Procrustes impressus, P. græcus, Carabus emarginatus, C. intermedius, C. fusus, C. sylvestris, C. alpinus, C. Linnei, C. Bonellii, C. arvensis, C. scabriusculus, C. croaticus, C. Preyssleri, C. intricatus, C. comptus, C. convexus, C. Wiedemanni, C. euchromus, Silpha cribrata, S. Souverbei, Phanæus nigrocyaneus, Geotrupes opacus, Copris impressicornis*), from Aug. R. Grote.

MAY 9, 1864.

20 **Lepidoptera** (*Hesperia Verna, H. Vialis, H. Wamsutta, H. Otho, H. Metacomet, H. Ocola, H. Mystic, H. Hobomok, H. Huron, H. Cernes, H. Phylæus, H. Persius*), from William H. Edwards.

JUNE 13, 1864.

26 **Diptera** (*Cistogaster divisa, Doros flavipes, Paragus dimidiatus, P. angustifrons, Helophilus latifrons, Scatophaga stercoraria, Scatopse pygmæa*), from Dr. T. B. Wilson.

20 **Diptera** (*Bombylius atriceps, Geron subauratus, Apatomyza nigra, Spilomyia hamifera, Didea fuscipes, Cheilosia capillata, Metoponia fuscitarsis*), and 2 **Coleoptera** (*Corymbites nigricollis, Gaurotes Cressoni*), from E. T. Cresson.

11 **Diptera** (*Bombylius validus, Temnostoma alternans, Pterallastes lituratus Chrysochlamys buccata, Cheilosia plumata*), from James Ridings.

5 **Coleoptera** (*Chrysobothris purpurata, Corymbites brunnipes, Melöe Afer*), from John Pearsall.

4 **Coleoptera** (*Spermophagus robiniæ*), from the Palmetto Fruit, with specimens of the latter, from Prof. J. Ennis.

3 **Coleoptera** (*Cardiophorus montanus, Chrysomela pallida, Coccinella Æthiops*), from the Committee on Collecting Fund.

2 **Coleoptera** (*Lytta tarsalis*), from Benj. D. Walsh.

2 **Diptera** (*Geron calvus, Pterallastes thoracicus*), from Wm. Evett.

2 **Diptera** (*Helophilus albiceps, Merodon curvipes*), from James Angus, of West Farms, N. Y.

2 **Diptera** (*Bombylius pulchellus*), from Wm. Wenzel.

1 **Coleoptera** (*Pithyobius Billingsii*), from B. Billings, Jr., of Ottawa, C. W.

1 **Coleoptera** (*Staphylinus capitatus*), from Wm. Saunders, of London, C. W.

1 **Diptera** (*Spilomyia fusca*), from Harvey J. Rich, of New York.

JULY 11, 1864.

35 **Coleoptera** (*Cicindela pulchra, Trachybrachys inermis, Dichelonycha fulgida, Ancylochira maculiventris, Melanophila gentilis, Agriotes mancus, Lacon rectangularis, Bostrichus bicaudatus, B. aspericollis, Tomicus pini, Hylurgus obesus, H. rufipennis, Collops tricolor, Platydema excavata, Serropalpus substricta, Trimytis

pruinosa, Tragosoma Harrisii, Criocephala productus, Pogonocherus mixtus, Aedilus obsoletus, Argaleus nitens, Leptura obliterata, L. subargentata, L. convexa, L. auripilis, Microrhopala cyanea), from the Committee on Collecting Fund.

18 **Coleoptera** (*Amblychila cylindriformis, Brachinus americanus, B. ovipennis, B. stygicornis, B. perplexus, Loxandrus agilis, Trechus micans, Berosus pantherimus, Agrilus otiosus, A. puncticeps, Asaphes melanophalmus, Cardiophorus tumidicollis, Collops tricolor*), from Dr. Thomas B. Wilson.

SEPTEMBER 12, 1864.

135 **Diptera** (*Tetanocera valida, T. pictipes, T. arcuata, T. pallida, T. saratogensis, Sepedon pusillus, Trypeta suavis, T. clathrata, T. aequalis, T. solidaginis, T. festiva, T. bella, Conops tibialis, Chrysotoxum fasciolatum, Scaeva Lesueurii, Syrphus politus, S. obliquus, S. marginatus, Sphærophoria cylindrica, Platycheirus quadratus, Toxomerus geminatus, Orthoneura ænea, O. nitida, Paragus angustifrons, Eristalis dimidiatus, Helophilus similis, Stylogaster stylata, Chrysophila quadrata, Sargus decorus, Nemotelus unicolor, Thereva nigra, Sparnopolius fulvus, Atomosia pygmaea, Discocephala abdominalis, Dolichopus setifer, D. ramifer, D. splendidus, D. vittatus, D. bifractus, Psilopus sipho, Hygroceleuthus latipes, Pelastoneurus lugubris, P. vagans, Diaphorus spectabilis, Sympycnus lineatus, Phasia atripennis, Hyalomyia occidentis, Calliphora erythrocephala, Drosophila dimidiata, D. amœna, Ortalis viridulans, O. ænea, Loxocera cylindrica, Cordylura bimaculata, Eumetopia rufipes, Sapromyza philadelphica, Parydra bituberculata, Paralimna appendiculata, Chlorops trivialis*) from Dr. Samuel Lewis.

23 **Coleoptera** (*Tetracha sobrina, Procerus gigas, Copris eridaunus, Phanæus mimas, Semiotes ligneus, S. distinctus, S. intermedius, S. Sommeri, Elater aurilegulus, E. sanguinolentus, E. lythropterus, Alaus Parreyssii, Euphoria rufina, E. Hera, Cetonia 4-guttata, Trox crenatus, Saperda græca, Rosalia alpina, Aromia ambrosaica, A. rosarum, Aegosoma scabricorne, Ptychodes politus, Acrocinus longimanus*), and 6 **Lepidoptera** (*Parathyris Angelica, Heterocampa leptinoides, Arctia Saundersii, Catocala subnata*), from Aug. R. Grote.

6 **Diptera** (*Ortalis notata, Melanophora roralis*), from E. T. Cresson.

2 **Diptera** (*Gymnopternus crassicauda*), from Dr. T. B. Wilson.

OCTOBER 10, 1864.

85 **Hymenoptera** from Dr. Samuel Lewis, 54 from Dr. Thos. B. Wilson, 24 from E. T. Cresson, 8 from C. A. Blake, and 6 from J. H. B. Bland, all of which are types of species described by E. T. Cresson in Vol. 3, Nos. 1 and 2 of these Proceedings.

2 **Lepidoptera** (*Argynnis Diana* ♂ and ♀), and 1 **Orthoptera** (*Acanthodis macrocerus*), from William H. Edwards.

NOVEMBER 14, 1864.

The fine original Collections of Prof. Felipe Poey, of Havana, Cuba, consisting of Cuban **Coleoptera**, over 1100 species, **Hymenoptera**, about 300 species, and **Hemiptera**, over 300 species; presented by Dr. Thos. B. Wilson.

75 **Coleoptera** and 29 **Lepidoptera**, principally European, from Rev. C. J. S. Bethune, of Cobourg, C. W.

29 **Diptera** (*Tipula pallida, T. hebes, T. fasciata, T. caloptera, T. bella, T. tricolor. T. bicornis, T. brevicollis, Pachyrhina macrocera, Nephrotoma eucera, Ceratopogon lineatus*), from E. T. Cresson.

26 **Diptera** (*Tipula longiventris, T. speciosa, T. infuscata, T. unicolor, Pachyrhina tenuis, Trichocera maculipennis, Anopheles punctipennis, A. maculipennis, Chironomus byssinus*), from Dr. T. B. Wilson.

3 **Diptera** (*Tipula strepens, T. cincta*), from Baron R. Osten Sacken.

3 **Diptera** (*Cuterebra americana, Scenopinus glabrifrons*), from James Ridings.

1 **Diptera** (*Cephalemyia ovis*), from George Newman.

DECEMBER 12, 1864.

40 **Coleoptera** (*Eugastra ventricosa, Tostegoptera lanceolata, Lachnosterna farcta, L. torta, Pyrophorus physodermus, Crigmus texanus, Chauliognathus scutellaris. Eleodes robusta, E. nupta, Pyrota mylabrina, Nemognatha apicalis, Arhopalus erythropus, Eriphus ruber*), from E. J. Nolan.

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DONATIONS TO LIBRARY.

APRIL 11, 1864.

Monographs of the Diptera of North America, by H. Loew. Part 2, edited by R. Osten Sacken. 1 vol. 8vo. From the *Smithsonian Institution.*

The Prairie Farmer (Chicago, Ill.) Vol. 13, Nos. 1—15.

The following works were presented by *J. Carson Brevoort*, Esq., of Brooklyn, New York :—

Etudes Entomologiques. Par F. L. DeLaporte. 1 vol. 8vo.

Conspectus Insectorum Coleopterorum, quæ in Republica Peruána observata sunt. Auctore G. F. Erichson. 1 vol. 8vo.

Monographie der Carabiden. Von Zimmermann. 8vo.

Révision de la Famille des Cicindélides de l'ordre des Coléoptères, par M. Th. Lacordaire. 8vo.

Genera Dyticeorum. Auctore Dr. G. F. Erichson. 8vo.

Beschreibung einiger neuer in der Mammuth-Höhle in Kentucky auf-gefundener Gattungen von Gliederthieren. Von Dr. Th. Tellkampf. 8vo.

Uebersicht der Arten der Gattung Astacus. Von Erichson. 8vo.

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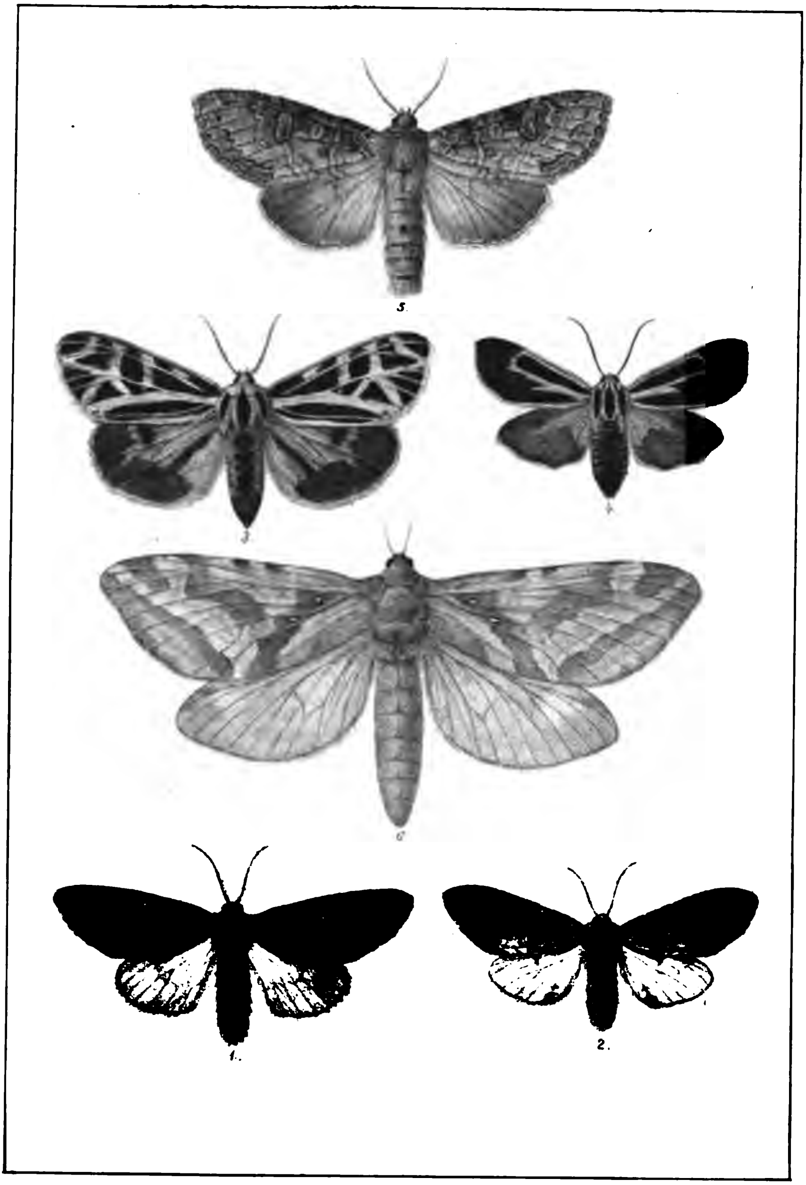
ERRATA AND CORRIGENDA.

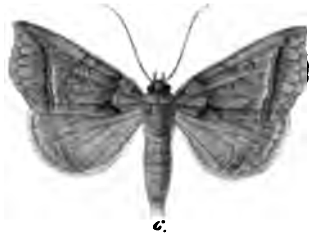
Page

198, line 12, for "usually" read "unusually."
203 " 9, for " Ephemerina" read " Ephemerina except Bætisca."
298 " 3, for "p. 239" read "p. 239 bis."
240 " 10, for "more cephalized" read "less cephalized."
253 " 20, for "ATRUS" read "ATRATUS."
322 " 34, for "1.08" read "1.80."
323 " 20, for "1.07" read "1.70."
324 " 8, for "1.05 to 1.08" read "1.50 to 1.80."
325 " 32—33, for "1.08 to 2.05" read "1.80 to 2.50."
326 " 33, for "3.06" read "3.60."
331 " 6, for "Larræ" read "Larvæ."
" " 9, 10, 13, for "Strips" read "Stirps."
" " 16, 20, for "*nora*" read *nova*.
334 " 24, for "them" read "it."
335 " 11. before "Walk.," insert *Lagoa opercularis*.
336 " 16, for "Cochlidianæ" read "Cochlidiæ."
" " 22, after "specimens" insert "collected in Texas."
337 " 28, for "here" read "have."
340 " 22, for "*Phobetion*" read *Phobetron*.
341 " 20, for "were" read "are."
342 " 29, after "lines" insert "passing."
" " 31, for "v" read V.
349 " 14, for "tibia" read "tibiæ."
354 " 2, for "cinerous" read "cinereous."
" " 38, for "1657" read 1857.
356 " 19, for "when" read "where."
364 " 9, for "addomen" read "abdomen."
366 " 28, for "pronotem" read "pronotum."
368 " 3, for "disclosed" read "discolored."
370 " 21, 22, for "*Mantes*" read *Manteo*.
371 " 20, for "lunates" read "lunules."
385 " 36, for "*Eutirchæ*" read *Eutrichæ*.
" " 38, for "Strips" read Stirps.
394 " 21, for "Caribon" read Caribou.
398 " 5, for "pulvuli" read "pulvilli."
400 " 6, for "pulvuli" read "pulvilli."
546 " 34, for "twelve" read "fifteen."
549 " 7, for "*petiliocola*" read "*petiolicola.*"
567 " 18, for "exude" read "are proved to exude."
573 " 15, for "confimed" read "confirmed."
549 " 31, for "*C. coryloides*" read "*S. coryloides.*"
614 " 15, for "larva" read "larvæ."
690 " 20—21, for "*Diplosis*" read "*Diplolepis.*"

See page 395 for Errata in Mr. Packard's Synopsis of Bombycidæ of the U. S. Part 1.



1. **Notodonta basistriens,** ***Walk.*** **♂.**
2. **Notodonta stragula,** ***Grote.*** **♂.**
3. **Arctia Persephone,** ***Grote.*** **♂.**
4. **Arctia decorata,** ***Saunders.*** **♀.**
5. **Eurois purpurissata,** ***Grote.*** **♂.**
6. **Gorgopis quadriguttatus,** ***Grote.*** **♀.**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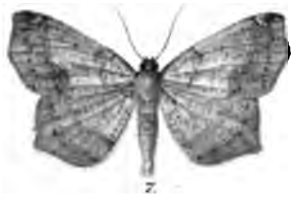
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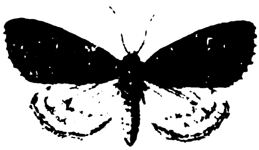
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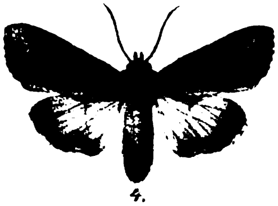
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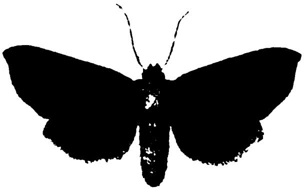
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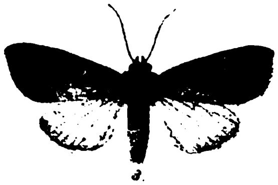
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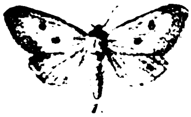
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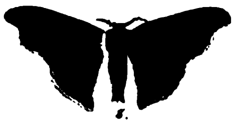
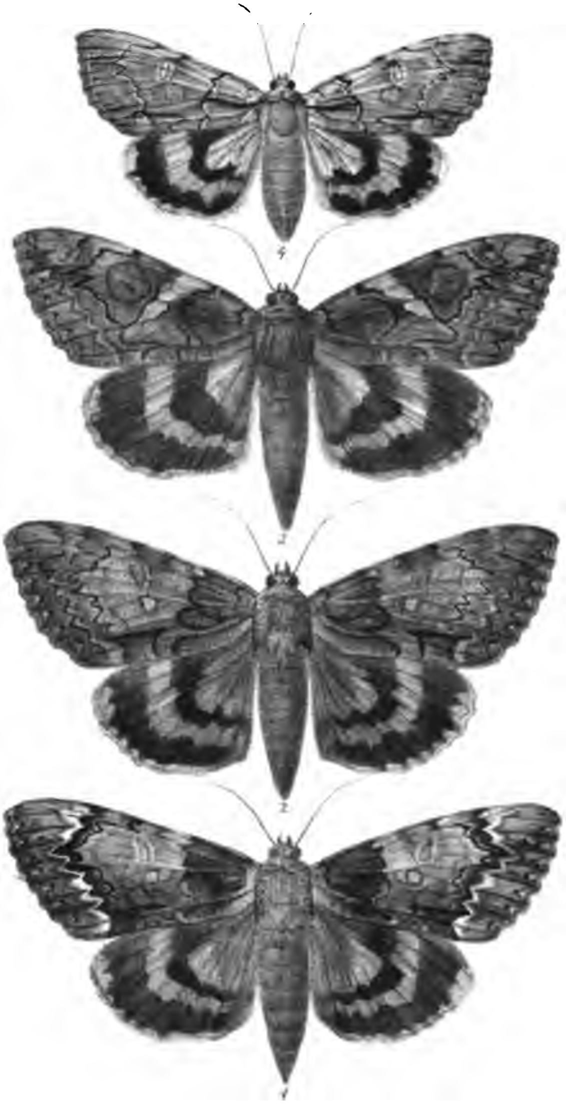
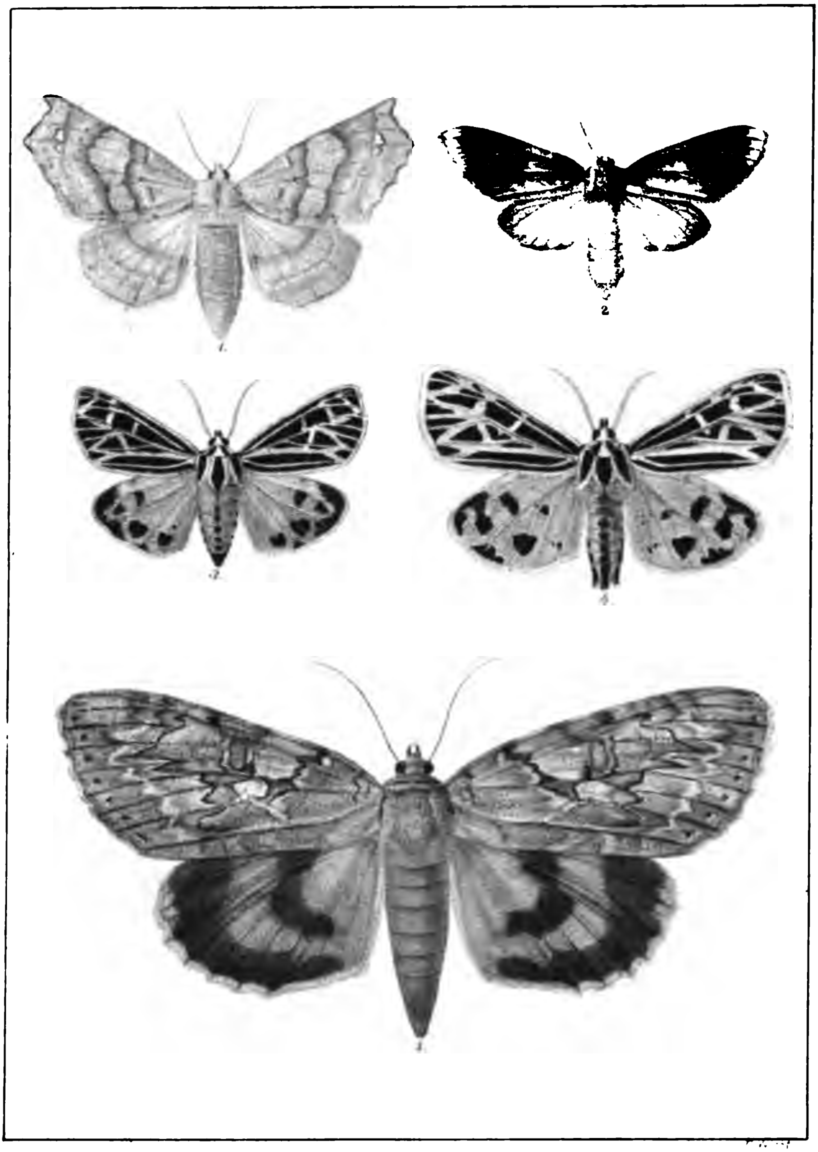

8.

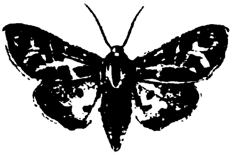
1. **Philomma Henrietta,** *Grote.* ♀.
2. **Microcœlia diphtheroides,** *Guen.* ♀.
3. **Gortyna cataphracta,** *Grote.* ♂.
4. **Apamea legitima,** *Grote.* ♂.
5. **Plusia æreoides,** *Grote.* ♀.
6. **Litomitus elongatus,** *Grote.* ♂.
7. **Epione depontanata,** *Grote.* ♂.
8. **Lacosoma chiridota,** *Grote.* ♂.



1. Catocala phalanga, *Grote.* ♂.
2. Catocala palæogama, *Guen.* ♂.
3. Catocala piatrix, *Grote.* ♂.
4. Catocala Clintonii, *Grote.* ♀.



1. Parathyris Angelica, *Grote.* ♀. **3. Arctia Saundersii,** *Grote.* ♂.
2. Heterocampa leptinoides, *Grote.* ♀. **4. " virgo,** *Linn.* ♂.
5. Catocala subnata, *Grote.* ♂.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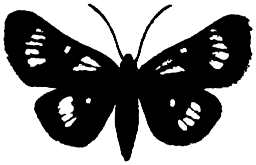
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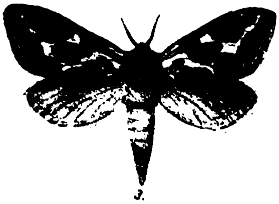
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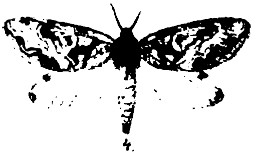
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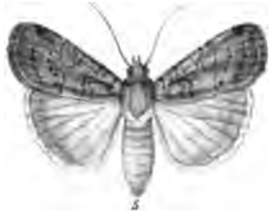
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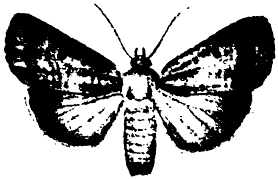
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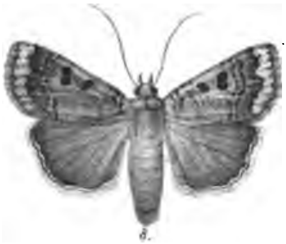
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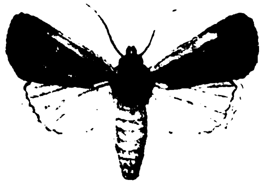
6.

1. Alypia Ridingsii, *Grote.* ♂.
2. Arctia Blakei, *Grote.* ♀.
3. Hepialus pulcher, *Grote* ♂.
4. Hepialus gracilis, *Grote.* ♂.
5. Noctua brunneicollis, *Grote.* ♂.
6. Noctua vittifrons, *Grote.* ♀.
7. Noctua cupida, *Grote.* ♂.
8. Noctua alternata, *Grote.* ♀.

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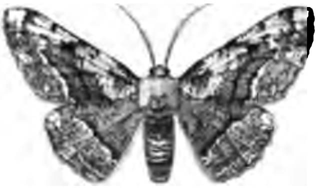

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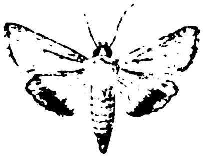

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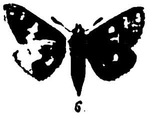

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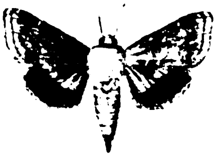

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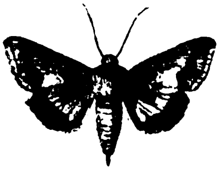

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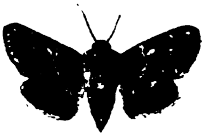

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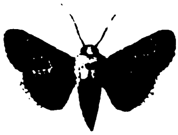

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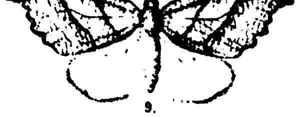

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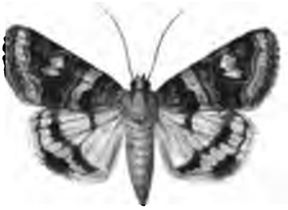

7.

1. **Anthœcia mortua,** ***Grote.*** **♂.**
2. **Anthœcia Packardii,** ***Grote.*** **♀.**
3. **Anthœcia nobilis,** ***Grote.*** **♀.**
4. **Anthœcia brevis,** ***Grote.*** **♂.**
5. **Anthœcia brevis,** ***Grote.*** **♀ var?**
6. **Melicleptria villosa,** ***Grote.*** **♀.**
7. **Syneda Howlandii,** ***Grote.*** **♀.**
8. **Amphidasys cupidaria,** ***Grote.*** **♂.**
9. **Eudapteryx bilineata** ***Packard.*** **♀.**